SUPPLEMENT.

The Mining Journal,

RAILWAY AND COMMERCIAL GAZETTE:

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

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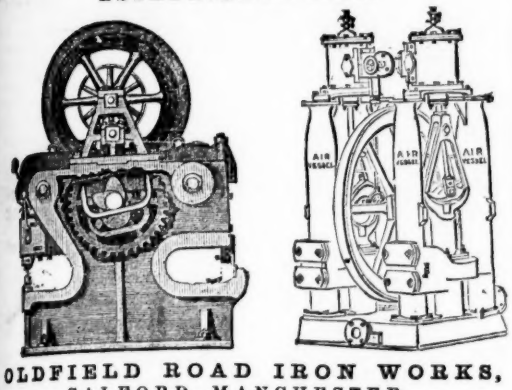

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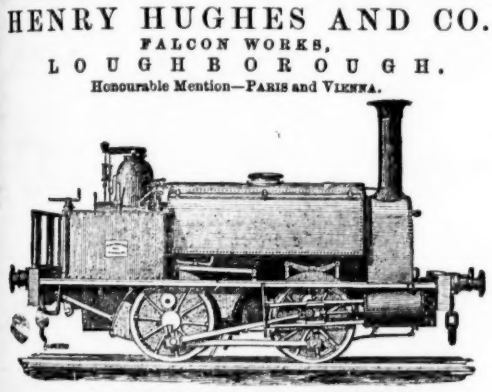

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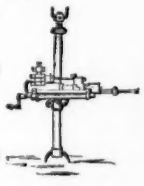

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Patent No. 4150 - - - - - Dated 17th December, 1873.

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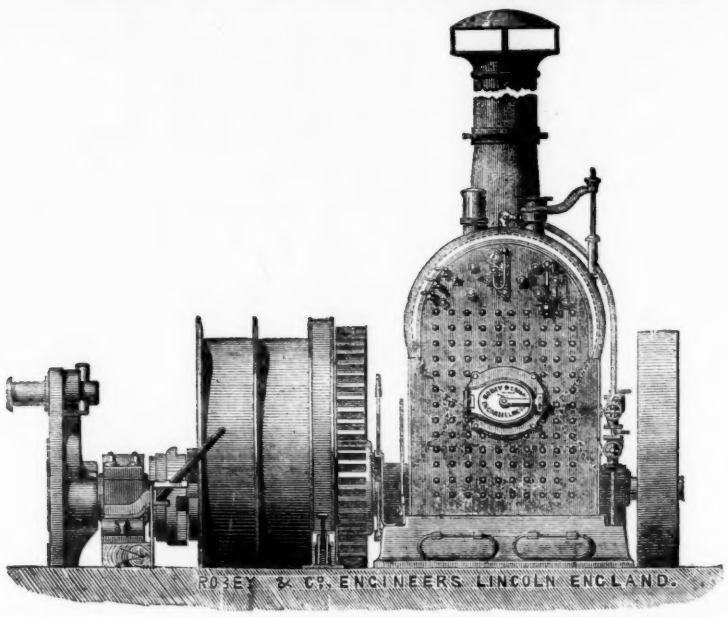

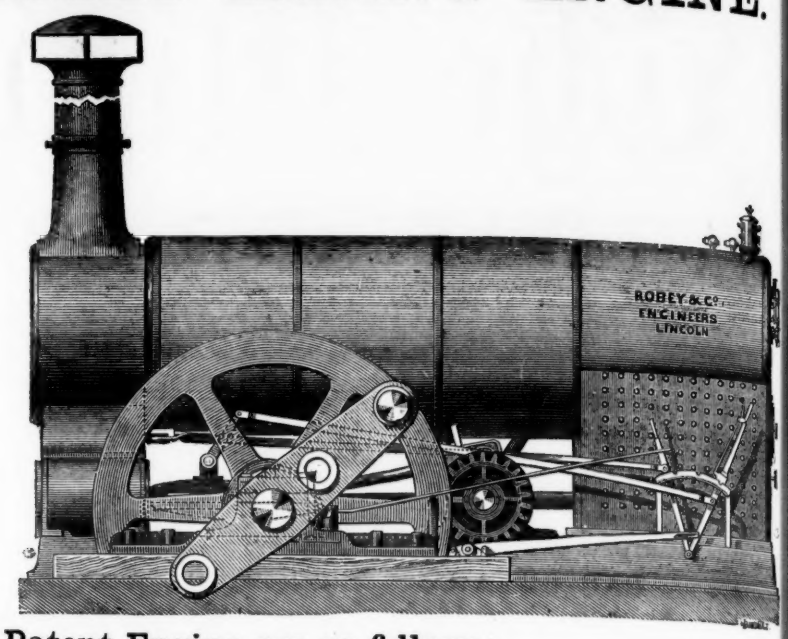

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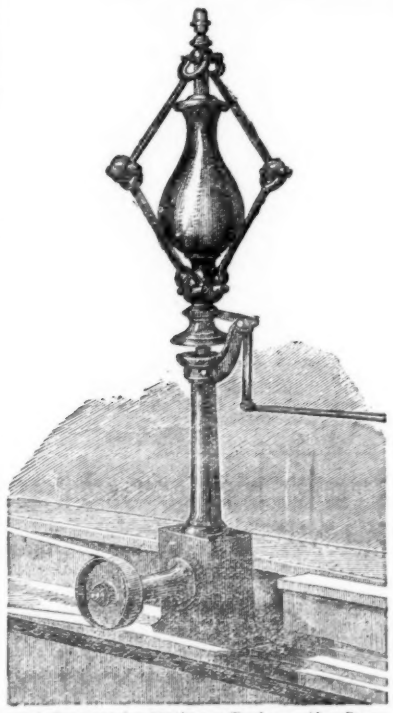

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IRON AND STEEL MANUFACTURE.

In connection with the purification of iron and its conversion into steel, and in the fettling of puddling-furnaces, an invention has recently been patented by Mr. JAMES BARMETT, of Harwood-street, Chalk Farm Road, according to which he makes a saturated solution of salt, and pours a quantity of such solution, say one or two ordinary bucketfuls, into the puddling-furnace, in which an amount of cinder may also be deposited. He, moreover, saturates the purple ore used as fettling with the above saline solution, using such purple ore in the ordinary way as fettling, in conjunction with "tap," "pottery mine," &c. He also pours into the furnace between each heat a bucketful of the saline solution, to set the cinder with and to further protect the bottom plate. He further takes any earthy or any carbonaceous matter, granulated or otherwise, and saturating the same with the saline solution, burns it down at a slow heat into a granulated form, which material he again mixes as desirable, either with the above solution of salt or with water, and he throws this on the bottom and at the sides of puddling-furnaces, both as fettling and as a purifier of the iron made. He also saturates with the solution any vegetable or any earthy matter, granulated or otherwise, and throws the same into the puddling-furnace, either before charging with the pig-iron or as the metal melts; the same material serving as fettling, and also as a purifier of iron by means of equally distributing salt, or salt and carbon, throughout the metal while the puddling process is in force. For the purpose of cleansing, hardening, and steeling the surface of manufactured iron, he takes carbon and boils it down in the saline solution until the moisture evaporates, or takes carbon steeped in the saline solution, and burning the same into a granulated form, saturates it with any oleaginous matter and forms a paste; this he spreads over the iron to be acted upon, and subjects it to the action of heat until the steeling process becomes complete.

To expedite the operation of rolling, in order to reduce the mass of iron or steel to the required from, Mr. PETER KIRK, of Workington, proposes to combine two or more sets of "three-high" rolls, or of three-high and two-high rolls, in such a manner as that the ingot or bloom is passed through a first set of roughing-out rollers, and is received therefrom by the next set of rolls, and having passed between all the lower rolls is returned between the upper rolls. In the arrangement which he now prefers he employs a first set of two rolls in conjunction with a "three-high" mill, the rolls in the latter being driven at a suitably higher surface speed as compared with the said first set. The one set may be geared with the other set, or each set may be separately driven. He prefers to employ a three-high mill, constructed in accordance with his former invention, and provided with apparatus for returning the bar. In some cases he passes the ingot, bloom, or bar through more than two sets of rolls before returning it between the upper rolls. When combining two three-high mills he drives each set separately, for example, by means of a separate engine or pair of engines, and either regulates the comparative speeds as required, or so regulates the driving power that the speed of one set of rolls is regulated by the rate of motion of the bar or bloom, employing a weaker driving power or a power having less momentum for one set of rolls than for the other set, so that the motion of the one set is speeded or retarded by the passing bar which is being drawn or pushed by the more powerful set. In lieu of employing two engines or sets of engines he communicates motion from the more powerful set of rolls to the weaker set by friction, for example, the spur wheel, which receives motion from the main driving shaft or axle, may communicate motion by means of adjustable friction blocks to a disc or boss fixed on the axle or shaft which imparts motion to the weaker set of rolls. He prefers to mount both sets or all the combined sets in one set of standards or frames, in order that the sets of rolls may be brought close together.

Several improvements in the manufacture of iron and steel tubes have recently been proposed. The nature and novelty of the improvements invented by Mr. R. A. MALCOLM, of Glasgow, consist in the arrangement of two horizontal rollers carried in bush-bearings in side standards, and geared by wheels on one end of their shafts, so as to revolve at the same rate, having a bevilled flange or rim on the reverse ends of each, and having the other plain or cylindrical end made so that it can pass in through a hole in the side frames, either clear or as in bush-bearing, so that these rollers could each be traversed longitudinally in reverse directions, and set with their flanges to any desired width to suit the plate to be gripped and drawn in and be searfed by the bevilled edges when that is desired, so that these rollers would draw the plate in always in the centre of the machine through a hollow conical mandril or bore placed close up to the back of the rollers with its under inner surface lying nearly horizontal or tangential to the upper surface of the upper roller, the front end of this mandril which receives the plate from the rollers being curved nearly to the shape of the two rollers. The novelty of the second part of the improvements consists in the arrangement of a pair of horizontal and vertical geared rollers, with nearly semicircular grooves in them, working opposite or with their peripheries on each other at the same speed for drawing the tube out of the furnace, and welding the joints with an internal mandril passing through and between both pairs of rollers, over which the joint is welded and the tube accurately shaped into the cylindrical or tubular form, and with its long retaining stem carried forward and fixed in the usual holding or retaining block in front of the whole length of the tube to be delivered on to it, and which is disengaged from its retaining block and re-engaged after the withdrawal of each tube; and for the more clean and perfect forming of tubes in the welding rollers, the first pair of rollers is made slightly oval in the direction of the joint formed by the two semicircular grooves in the rollers, the second pair being more nearly spherical or slightly elliptical in the direction of their joints at right angles to the former, removes all scales, and the streaks usually formed by the joints at the grooves of the rollers when made in the usual manner, thus delivering a perfectly round and much smoother tube than hitherto. The nature and novelty of the third part of the improvements consist in cutting the welded tubes into lengths, after being welded as described, by a thin revolving steel disc, with or without teeth, secured between two large collars on a short portable screw spindle, much in the same manner as that of circular saws, working on centres passed through the two side standards of a strong frame with stay rods above, the centres being screwed and secured on each side of the standards by jamb nuts, and with turning heads on them outside, so as to accurately adjust the centres for the spindles of the disc, cutter, or saw, to revolve steadily, much in the same manner as the centres of lathes and boring machines, the spindle of the saw being driven by a pinion on it from a large wheel gearing thereinto on an adjacent driving shaft carried on the end of the same, or on a separate frame; also that the saw works steadily although driven at a very high speed. The tubes are quickly and easily cut cold or nearly so by griping them in a pair of broad tongs for the purpose, with long handles and a fulcrum spindle through them in or near their joints, which are inserted in open bearings in the top of a standard sufficiently close to and under the breast of the cutter or saw, that the person in using the handles of the tongs operates them as a powerful lever to press the tube up and forward against the cutter with a turning action, which speedily severs the tube, at the same time squaring and cutting the ends to their proper lengths; or they may be pressed against the disc by means of a screw.

In the ordinary method of manufacturing unwelded or open-jointed steel and iron tubes, the pile, bloom, or billet of steel or iron from which the tube is to be made is first rolled into a flat strip; flat strips thus made are heated and bent into the required form, the process of manufacture consisting of two distinct processes —the production of a flat strip and the bending of the said strip into a tubular form, whether the bending follows immediately upon the rolling of the strip or is effected later. Now, in the improved method invented by Messrs. W. and D. BROWN and VAUGHAN, of Smethwick, the tube is rolled direct from the pile at one heat. In operating upon the billet they commence to give it a trough shape, preferably by the first or second groove through which it is passed, and in the subsequent rollings the said trough-shape is further perfected, the metal at the same time being reduced in thickness and elongated. After the trough-shaped bar has been brought to the thickness and breadth required for forming the tube, it is passed through a groove having an elliptical section, the longer axis of the ellipse being situated horizontally. The trough-shaped bar is passed through this groove in a horizontal position, that is, one side of the trough is presented to that part of the elliptical groove which is situated in the upper roll, and the other side of the trough is presented to that part of the groove which is situated in the lower roll, the horizontal plane in which the rollers are in contact dividing the trough-shaped bar symmetrically. In order to make the trough-shaped bar take the elliptical figure of the groove in the rolls, an elliptical mandril may be supported between the rolls. This elliptical mandril supports the interior of the partially made tube, and together with the groove in the rolls gives a well formed elliptical figure to the tube. The edges of the partially formed tube are after this treatment a considerable distance apart. The partially formed tube is finally passed through a groove of a circular figure in cross section; the partially formed tube is passed through this groove with its longer diameter in a vertical plane. The elliptical figure of the tube is by this treatment converted into a circular figure, and a cylindrical tube with an open joint—that is, an unwelded but close joint—is produced, the two edges being in close contact, but not united. Instead of using one pair of rolls for bending the elliptical formed tube into a circular figure two or more pairs of horizontal rolls may be employed for that purpose. The interior of the tube may be supported by a cylindrical mandril during this rolling. It is claimed that by this invention open jointed tubes of excellent quality are very economically produced. The metal is not exposed to the strain and danger of cracking to which it is exposed when it is first rolled into a flat strip and afterwards bent into a tube, and as the number of rollings does not exceed, or exceeds but little, that required to make a flat strip they produce the said open jointed tubes at the same cost as open jointed tubes made from flat strips. Tubes of a square elliptical or other figure in cross section may be made by this method, and they may be plain or fluted externally.

IRON AND STEEL THE FIRST THREE QUARTERS OF 1876.

In a recent number of the Journal we published the Custom House Returns of the commerce which took place for the first three quarters of this year in the three superior metals—tin, copper, and lead, assigning as our reason the importance of marking at each quarter of the year the progress made in the metal trade, in order that the present condition and prospects of mining may be more precisely ascertained, in the interest of that great branch of British industry of which the *Mining Journal* is the oldest and most efficient chronicle. Indeed, to do this is a necessity, for it is impossible to measure aright our mining prospects without watching with sustained vigilance the progress of the commerce in the products of our mines. An intelligent observer, if not thoroughly acquainted with the ways of mining brokers and agents, would be puzzled if he were to spend any day a few hours on the mining share market, or call at the offices of Stock Exchange and mining brokers, and listen to their very various and even contradictory accounts of "the situation." We were informed this week by a gentleman largely interested in Welsh lead mines that business is reviving, that there is a rapidly increasing demand for shares in lead mines, more particularly Welsh. Another gentleman assured us that the stir in business proceeded from the success of the lead mines of the North of England. A third gentleman, an intelligent broker concerned in Welsh lead mines, assured us with doleful countenance that "there is no business doing; nothing whatever." Another said he "never knew things worse." His department is more especially in copper. A Cornish gentleman of 40 years standing in mining experience declared that "tin mining in Cornwall was on the point of extinction," while another gentleman, who had equal opportunities of knowing, said "Tin will look up, we need not now be much afraid of foreign competition, and the prospects of lead mining are excellent." In fact, each man refers to the quality of his own individual business as the only test of the state and the prospects of mining in general. But when we give the statistics of the trade in metals and minerals at least every quarter, as furnished by authority, that "regulates the clock," and tells us what the real time is. This has been done for the third quarter and the three quarters of the year in connection with the three valuable metals above named. Our space did not permit us to comprehend all; let us now endeavour to point out the statistics of the iron trade as we have collected and collated them.

Although Great Britain is a great exporter of iron, and has been greater, our imports are also considerable, chiefly of Swedish iron for the manufacture of steel, the ores of that country being better adapted to the purpose than any other. Eventually this trade will be greatly lessened, some think abolished, because our new processes for the manufacture of steel enable us to adopt our own ores, but for some time to come iron is likely to give place to steel for various uses, more particularly rails, that the imports are not likely to diminish. During the last nine months ores were imported to the value of 681,000*l.* (we shall confine ourselves to round numbers, giving the nearest round number approached). There has been a great increase over the first three quarters of 1875, when the value was 485,000*l.*, but the more active year 1874 shows within the same period a value of 876,000*l.* But last month shows that more iron was wanted (chiefly for making steel) than in the corresponding month of the two previous years), the figures were (moving backward) 87,642*l.*, 68,000*l.*, 77,000*l.* Bar-iron was imported during this year up to the 7th of this month to the value of 750,000*l.*, against 950,000*l.* last year in the same time, and 727,000*l.* the year before that. It appears that foreign makers are not supplying us with bar-iron to the extent of last year, but the same activity in these imports prevailed as in those of ores; last month the value being more than in 1875 or 1874, and in proportion to the whole nine months increased about 37 per cent.

Heavy complaints have been made that the German, Belgian, and even French, are beating us in iron manufactures in our own market. There are certainly some departments of iron manufactures in which the Germans excel us, both in skill and taste; but the area of coal is too small in Belgium for that country to maintain a permanent competition with us in any department of iron-making. The value of manufactured iron imported this year has been 1,047,463*l.*—30,000*l.* less than last year, but over 70,000*l.* more than at the same time the year before that. There is no material difference in those figures, but for the month there has been a marked diminution; the value for September was 111,145*l.*, against 155,000*l.* in that month twelve-months, and 149,000*l.* in September two years. The value of imports for the month sustained the proportion of the nine months. As to quantity, the number of tons of ore greatly increased, and of bars 25 per cent., and there was over 160,000 cwts. more of manufactured iron imported. The imports of iron have been manifestly cheaper, an element, of course, to be considered in any estimate as to foreign competition. Our steel imports were all unwrought. For the nine months they were valued at 112,000*l.*, nearly 30 per cent. more than during the corresponding period last year, which was only a trifle less than in that period in 1874. But the month shows a signal falling off, the value having been only 9000*l.* It was 250 per cent. more in September, 1875, and four times as much as in that month, 1874; and for the reasons given the diminution will, after some time, be more determined. The increase in quantities for the nine months shows falling prices upon the Continent; it was 7400 tons as compared with 5200 tons within the same time last year, and 4466 tons in that of 1874.

Perhaps it is proper here to notice our imports of pyrites. Those of iron, copper, and sulphur cannot be separated in the returns. The value of them all in the last three-quarters of a year has been very considerable, and ought not to be overlooked, as they constantly are in statistics of the metal trade. The amount has been 1,021,000*l.*, over 100,000*l.* less than in the first three-quarters of last year, and a few thousand pounds less than in those of the previous year. The decline on the month has been large, whether as compared with the whole nine months of this year or the corresponding months of previous years. There have been no material alterations in quantities, into the detail of which it is not necessary to enter. It must not be supposed by any reader who has not paid particular attention to the course of the metal trade that all the iron we import comes into direct competition with our own productions. Considerable quantities are exported, furnishing the metal or general merchant with a profit. Of course, there is no "re-export," as it is called, of ores; they are cumbersome cargoes, and not of an intrinsic value to sustain a commerce in them; besides, we only import what we require for manufacturing purposes. Neither do we re-ship pyrites of any kind. But of the bar-iron which we received we exported a value of 290,000*l.* Last year it was 357,000*l.*, and the previous year rather less than this. The falling off in the "re-export" of iron does not appear to be due to any other causes than the general decline of trade here and elsewhere. Of iron manufactures other than bars imported we do not appear to have sold a single ounce. The whole came into competition with our own market when it made its way by superior artistic design and finish.

Of the unwrought steel bought here 37,000*l.* worth was sent away again, an increase of 4000*l.* upon the first three quarters of last year, and 3000*l.*, more than twice as much, in the corresponding months of 1874. For the month we exported nearly double the value of imported steel, as compared with the same time last year. Of the export of British iron and steel production we have little, if indeed anything, to say which would cheer the gloom which hangs over this department of our mining industry and commerce in metals. The falling off has been signal and terrible, and any light that hope sheds upon our path is rather in the prospect of renewed railway demand, and the certain change from iron rails to steel in every country. This will undoubtedly cause a renewed activity. Our great metallurgists and manufacturers are also beginning to take measures for raising the standard of art workmen in iron and steel, so as more effectually to compete with our continental rivals, whether German, Belgian, or French. The value of our exports of iron and steel for the past three quarters of this year has been 15,690,000*l.*, nearly 4½ millions less than in the corresponding three quarters of last year, and more than 8 millions less than in the corresponding quarters of 1874.

Some hopes have been expressed lately in the columns of this Journal, and in the Press of the North of England and South Wales, that the export trade is improving a little; we are no croakers, but sad to say we see no decided sign of this. The value of the last month's exports was higher in proportion to the whole nine months. Were the whole three-quarters as good as the month the results would have been more favourable to the extent of about 2,000,000*l.*, for the exports of September were valued at 1,934,000*l.* That, however, was less by 300,000*l.* than September, 1875, and less by close upon 750,000*l.* than in September, 1874. The decline has been very general, pervading nearly all branches. Unwrought steel fell from 838,800*l.* in the longer period to 673,000*l.*, manufacturers of steel or steel and iron continued from 615,000*l.* to 575,000*l.*, pig-iron from 2,641,000*l.* to 2,115,000*l.*, bar, angle, bolt, and rod from 2,048,000*l.* to 1,459,000*l.* In railroad iron of all sorts the decline has been very heavy. Last year in the first three-quarters the value was 4,500,000*l.*, this year not far from 1,750,000*l.* less. For hoops, sheets, boiler, and armour-plates the fall was about 400,000*l.*, from 2,464,000*l.* last year. Tin-plates declined still more, showing a diminution of 750,000*l.* upon a value of less than 3,000,000*l.* last year. Cast or wrought iron, and all other manufacture except ordnance, showed a recession from 3,368,000*l.* to a trifle over 3,000,000*l.* The only gain was in old iron exports for re-manufacture elsewhere, too small for notice.

It is well understood that iron enters largely into the composition of machinery. The value of steam-engines exported was over 2,000,000*l.* the first three quarters of last year; this year, so far, only 1,470,000*l.* The decline in other descriptions of machinery was even more serious; from less than 5,000,000*l.* there was a decline of nearly 900,000*l.* Hardware and cutlery also presented a retrogression. Last year in the first three quarters the value was 3,200,000*l.*; this year, 2,650,000*l.* In arms and ammunition the decline was not very heavy, but both years show a great falling off from the year before. The depression in the month of September is represented by the following figures—2,667,000*l.* in September, 1874; 2,236,000*l.* in September, 1875; and 1,935,000*l.* in September, 1876. Unhappily the decline in quantities has been extraordinary as well as in values. Yet the cloud seems a little breaking up, and some streaks of light are breaking through. British energy, capital, perseverance, and trust in Providence must accomplish the rest.

MINING IN THE EAST—No. IX.

CUCHAINA SILVER-LEAD MINES.

Amongst the many mines worked by English capital in the East that of Maidan Cuchaina merits especial notice from the spirit evinced in buying a property when, from the shafts being full of water, a surface examination alone was possible, and for the persevering energy which the purchasers have displayed in opening their mines, and in providing excellent machinery for pumping and boring.

Some 15 English miles west of Maidanpek, occuping the much accidented slope of the mountain range which forms the watershed between the important agricultural valleys of the Pek and Mlava, lie scattered the long abandoned mines which, in ancient days, composed the valuable mineral district of Cuchaina. The approach from Kruschevitz, a large village built on a picturesque and fertile plain of the great Pek, is through a long ravine-like valley dominated on either side by rounded though sparsely wooded hills of decomposing syenite granite and frowning precipices of compact limestone rock, whose shattered escarpments showing but scant traces of stratification, evidence the inexplicable changes which long-continued metamorphic action can produce. On emerging from the upper portals of the ravine, which is here so contracted that the road has been cut out of the living rock, the colony and works of the Cuchaina Mining and Smelting Company suddenly come into view. The small but well-built colony consists of a single street of semi-detached one-storried houses, each with a plot of ground attached, running along the valley, with a background of luxurious forest on the steep acclivities of syenite hills. On clearing the street the smelting-house offices, and dwellings of the officials, are discovered conveniently situated on a plain, which owes its origin to the confluence of two mountain streams. This large mineral district would lose much of its value were it not supplemented by an extensive domain, from which supplies of wood, hay, &c., can be drawn. From the summit of the limestone boss above the village, in which are found the ores, a magnificent view is obtained over the largest part of the estate. The accidented character of the district is very remarkable—the long lines of limestone escarpments covering the summit ridges of the granite, and trachyte forming a conspicuous feature in the landscape, giving existence, as usual, to deep isolated valleys, whose waters, engulphed by large chasms, pass through the limestone hills by a network of caverns to the adjacent valley. The naked surface of the decomposing trachytic foot hills, riven by innumerable rain-gulleys, oppose a strange contrast to the mountains clothed in abundant vegetation. The comparatively narrow band of eruptive rock which has elevated in a direction nearly meridinal, the Jura limestone has also affected the Buntervandstein to the west, which has been changed into quartzite. Still farther west are the coal beds, where coal of tolerable quality is mined and utilised for driving the steam machinery at the mines and works. These strata form a rolling table-land dotted with large and excellent pastures, interspersed with forests and copse woods, resembling English park scenery, where the sportsman can delight himself in stalking deer, or in coursing hares.

No records exist to tell of the ancient working of the numerous mines surrounding Cuchaina, the discovery of which has been variously ascribed to the Romans, Venetians, and Turks. Although there is now no means of ascertaining at what period the Euchaina Mine and the still older unopened mines of the district, were commenced, still the indications afforded by numberless pingens and burrows cannot fail to convince the miner that operations on a large scale must have been carried on at various epochs. In excavating the foundations for some of the new buildings extensive remains of baths were discovered, evidently in connection with a warm well (68° F.) a few hundred yards distant, which issues from limerock

very near the mine. These baths have been considered Roman by Von Herder, who examined the district in 1835, and Turkish by Von Abel, who in 1849 was appointed by the Servian Government to resussitate the mines in the north-east of the Principality. There is great probability that the mines were worked by the Ottomans, as their weights have been found, and some articles used in their domestic life. During the ascendency of the Austrians it appears certain that levels were commenced and driven some distance to open up the old mines, but the Turko-Austrian war of 1734, no doubt, led to their suspension. The Servian Government commenced, in 1849, to open the long idle mines, but all their resources were demanded for the installation of the ironworks at Maidanpek, and but very little was done to open the silver-lead deposits of Cuchaina.

In their anxiety to have the mines speedily at work the Government consented in 1853 to lease the whole of the Cuchania mining district, together with the domain, containing about 40,000 acres of pasture lands and forests, to Felix Hofmann and Company, at a royalty on the profits made. The levels driven by the Austrians were continued to the deposits, and large nests of lead ore, rich in the precious metals, were discovered, together with quantities of calamine. To reduce these ores large and complete smelting works and dressing-floors were, at a heavy outlay of capital, erected, and the manufacture of lead and zinc commenced.

The pockets of ores above the water level of the adjacent valley becoming exhausted, it was necessary to follow them below the deep adit, and as the raising of water from the various points of operations grew tedious and expensive, it was deemed expedient to sink an engine-shaft to a depth of 40 fms., and drive a level at that depth under all the ore leads. This level was driven 30 fms. towards the Nicholai shaft, when a drusy rock was cut, and filled the level and shaft with water so suddenly that the miners had difficulty in escaping. Owing to some cause—probably want of capital—no pit-work or machinery had been provided, and the company failed to explore the mine in depth. After this event only a few miners were employed to tribute about the old workings, and the mine ceased to be worked.

In 1873 the Messrs. Bright, the well-known telegraph engineers, became acquainted with the mines, and, after some negociation, purchased the whole of the mines, works, village, and estates, inclusive of the adjoining coal seams. A new and energetic era now commenced, and in a short time pumping machinery was erected, the shaft cleared of water, and the 40 fm. level resumed in order to reach the rich ore ground in depth. A little later on an air-compressor was put up, and boring machines introduced to drive more rapidly important points, which were cleared of water by special pumps. Fortunately the prosecution of these researches eventuated in discovering a valuable deposit of rich ores. Notwithstanding the heavy outlay incurred in preliminary operations, and purchase and erection of machinery, the result of the first year's working was a handsome profit. The auriferous ores of lead and zinc were sent to Freiberg and sold in the raw state. The 40 fm. level has been pushed steadily forward, and is now under the ore deposits, and a good discovery may any day be made, whilst a drivage of 12 fms. more will attain the Nicolai shaft, immediately after communicating with which the whole of the rich pitches abandoned in consequence of heavy water charges will be resumed.

One cannot resist admiring the speculative hardihood here exhibited by two Englishmen in a foreign country, who have single-handed, in the face of gloomy prognostications, persevered in the working of rock-drills in a mine where the irregular character of the deposits in hard limerock necessitates the driving of tortuous levels, to which the regular galleries required by vein mining are not to be compared when driving by boring machines is considered. In spite of the dangerous state of things in Servia which the Turko-Servian war produces the works have been continued, and latterly the number of miners have been largely increased.

Oravitza, Oct. 14. EMPRESSARIO.

SOUTH AUSTRALIAN MINES.

SIR,—My last letter informed you of the action taken by a certain party in the House of Assembly with reference to the mineral leases granted to Messrs. Harvey, Cooke, and Lawrance. I now enclose you the report of the Select Committee, and the comments of the "Register" newspaper thereon—both of which I should be glad if you would publish. I believe the publication would interest many persons in England who know something of the mines of South Australia, and I am sure that no one here who has any knowledge of our mines has any fear of the strictest enquiry being made respecting them:—

THE MINERAL LICENCES SELECT COMMITTEE.

The following is the report of the Committee of the House of Assembly on Mineral Licences. It was laid on the table by Mr. Bright on Tuesday:—

1.—Your committee have examined several witnesses respecting the issue of certain mineral licences to Mr. A. Harvey and Messrs. Cooke and Lawrance, and other matters in connection therewith, and respectfully report to your Honourable House as follows:—

2.—That a very large number of mineral claims, amounting to 11,066 acres, have been granted to the above-named gentlemen, greatly in excess of anything that has ever been issued to any other company, and several of such claims have been previously held under mineral leases.

3.—The application for renewal of the claims was out of the ordinary course—the application being made and the money forwarded several weeks prior to the expiry of the licences, and in no instance had any search for minerals been made when the application was sent in.

4.—The opinion of the law officers of the Crown was asked as to whether one person could legally make simultaneous applications for and hold more than 640 acres in accordance with the regulations of 1869; and, in reply, your committee was informed that such licences could be legally issued, and they recommend that the regulations should be altered, so as to provide that one person shall not hold more than a square mile under mineral licence.

5.—Your committee are further of opinion that it is to be regretted that when the renewal of the licences was applied for in May, 1876, the Commissioner of Crown Lands did not exercise his undoubted right of refusal, as the evidence shows that this large number of mineral claims was taken out not so much with the object of searching for minerals as for the purpose of speculation (*vide* United Mines Company's prospectuses), it also being stated that had it not been probable that the Port Augusta Railway Bill would have been passed the claims would have been abandoned.

6.—It is shown in evidence that Messrs. Harvey, Cooke, and Lawrance made an arrangement and entered into an agreement with some gentlemen in England, and offers were made to Members of Parliament here to join in the speculation, which were, however, declined; but the evidence discloses the fact that money has been paid by private individuals for interests in the venture, the proceeds of such sales being divided between Messrs. Harvey, Cooke, and Lawrance.

7.—Your committee believe that the Port Augusta Railway Bill has been supported for general and public reasons by Members of Parliament who are named in the evidence taken; but they regret that Mr. E. Cooke, M.P., should have entered into financial speculations which could only be made successful by future legislation.

8.—Evidence was taken as to the capability of the country north of Port Augusta for mining purposes, and most of the witnesses agreed as to the large surface deposits of copper ore found there; but it was also stated that several attempts to work the mines profitably had been unsuccessful. Various causes are assigned, amongst others the want of a facile means of transit.

9.—Your committee regret that the report on mines and minerals in the Handbook lately published under the authority of the Government was not reported upon by the Inspector of Mines before it was published, as the statements made therein might probably give a false impression to persons outside the colony as to the value of the country for mining purposes.

10.—The refusal of some of the witnesses to answer certain questions (the witnesses pleading the communications were private) prevented your committee from arriving at a definite conclusion on some matters connected with this enquiry.

Committee Room, Sept. 5. H. E. BRIGHT, Chairman.

THE UNITED MINES COMPANY.—We publish elsewhere the report of the Select Committee appointed, on the motion of Mr. Bright, "to enquire into and report upon all circumstances relating to the issue of certain mineral licences to Mr. A. Harvey and Messrs. Cooke and Lawrance, and also all other matters in connection therewith." To our minds this is a most unsatisfactory and disappointing document. It deals more largely in vague inuendo than any similar report we can call to mind, while it is very chary of recording any clear and distinct opinion upon many of the issues involved. Upon the statements embodied in the prospectuses of the United Mines Company it expresses no opinion whatever, although it travels out of the record to condemn certain passages in the Handbook lately published under the authority of the Government. Bearing in mind that the responsible Editor of that Handbook is no longer among us to defend himself, and that his untimely death has elicited a universal expression of respect and regret, it seems to us that the paragraph in question is in the very worst taste, and could only have been justified by anticipations of mischief which are very unlikely to be realised. If the committee thought that a warning was necessary to prevent people from attaching undue value to the mineral wealth of the North—and in this we are at one with them—such a warning could have been easily given far more emphatically without reflecting by innuendo upon the way in which the late Editor of the Handbook discharged his duty. In other respects, also, the report appears to us to be unsatisfactory, if not inaccurate; but we prefer to reserve further comments upon it until we have had an opportunity of perusing the evidence upon which it is founded.

It is strange, and somewhat annoying, after two or three previous Select Committees of the House, at intervals of several years, have made the strictest investigation into the subject, and reported favourably on the mineral wealth of the Far North, that a small political clique should open up the subject again, with the design of casting doubt upon all previous evidence, and endeavouring to upset the leases which have been granted. As I have before remarked, they are grossly inconsistent, for their first attempt was to make it appear that the mines were not nearly so good as they had been represented to be—that the published accounts of them were wilfully and designedly exaggerated—and then they turn round and say that these mines, though not good enough for us to work, are too good to let English capitalists get possession of. This pretended zeal for the welfare of English capitalists reminds one of Dickens's tale—"Codlins is the friend, not Short." They affect an anxiety for the good of others, and a desire to prevent them from being taken in, which very few persons here give them credit for.

As to the quantity of mineral lands taken up, it was open to anyone else to have done the same thing, and it really looks very much as if the members of the committee regretted they did not avail themselves of the opportunity. Most of the mineral claims taken up by Messrs. Harvey, Cooke, and Lawrance had been previously abandoned on account of the want of means of carriage, and those gentlemen, being rather more far-seeing than other people, took them up in anticipation of the Port Augusta Railway being constructed—and small blame to them. But they have not got all the mineral land in the Far North yet, by a great deal.

I have not time fully to explain all the circumstances of the case; but I cannot see that Mr. E. Cooke, M.P., is at all to blame for his action in the matter, and, if he were, the Chairman of the Select Committee should not have been the man to cast blame upon him. I do not hold all the members of the committee to blame—I believe the Chairman is the most so, and it is generally supposed he has been made the tool of others.

As to my chapter on the mines being submitted to the "Inspector of Mines" before publication, I may inform you that the inspectorship of mines is little more than a nominal office, held by the Surveyor-General, and, although he has, perhaps, a greater knowledge of the whole colony than any other man, I venture to think that he has not given that inspection to the mines that I have done—especially to those of the Far North. It would be easy to bring forward an overwhelming mass of evidence in proof of the correctness of my account of the mines, and, if necessary, it shall be done. So much for the insinuations of the committee as to the Handbook giving "false impressions" on this subject "They are ill birds that foul their own nests."—*Adelaide, Sept.* 7. J. B. AUSTIN.

ATLANTIC AND GREAT WESTERN RAILWAY AND ERIE RAILWAY FUSION.

SIR,—Atlantic and Great Western and Erie, now that both are in process of narrow guaging, steel railing, and re-constructing, should be amalgamated. As one in favour of the re-organisation scheme of both concerns, I am of opinion—and I think it will be the opinion of all the bond and shareholders of both—that the two railways' interests are so identical that they, as one company, could be conducted at much less expense for administration and working management in London, New York, &c., and be made more convenient and serviceable to the public by being fused. When re-constructing both, now is the time for Sir Edmund Watkin and the re-construction committee of both, and I do not doubt Mr. James MacHenry, Sir E. Watkin, and the proprietors of the two companies, might easily come to a mutually advantageous agreement for an amalgamation that would make one of the most prosperous railways from New York to the West. J. M. N. M.

Glasgow, Oct. 25.

MINING APPLIANCES.

SIR,—Several very useful suggestions recently made in connection with mining appliances are worthy of being placed on record, although but one to which I shall refer has been secured by patent, not the least important being that of Messrs. DAVIS and FIELDHOUSE, of Tipton, for an apparatus to be used in sinking pits or sumps; it is constructed with a metallic cylinder (varying in diameter and height according to the nature of the work to be effected) provided with a movable or detachable bottom, which is connected to the cylinder by hinges or by a central rod (referred to hereinafter), and in which are two valves or doors opening upwards, and near the outside of which four spikes pass through, and are cottered upon the upper surface of the plate, and in the centre of which is another spike similarly cottered, and above which latter cotter a beater is attached to prevent the said valves or door opening too wide. On each end of the diameter of the movable bottom is a hinge and clasp, one of which clasp is unfastened when the contents of the cylinder are required to be emptied out; otherwise if a centre rod is used passing through the entire length of the cylinder we form the centre spike at the bottom of the rod, and at the top of the cylinder we place a horizontal guard, a cotter on the upper suface of which keeps the movable bottom in its place. About 12 in. above this cotter is a movable cap, and when it is required to empty the cylinder the machine or apparatus is drawn up to the surface of the pit or sump, and the said cotter is removed, when the movable bottom will fall the 12 in., and the contents, sand, gravel, or earth, of the cylinder will escape, and if required, into a specially provided receptacle, or if the said detachable bottom is connected to the cylinder by hinges, as above mentioned, it may be detached by a plug.

Working within the said cylinder is a piston or bucket somewhat similar to an an air-pump bucket, which is provided with two valves opening upwards, and which are prevented opening too wide by a beater, and secured by bolts going through and to the under side of the bucket. The bucket is also provided with four eye-pins, underneath which are hinge-holes, in which the valves work. The said eye-pins are secured underneath the bucket, in the outer diameter of which are two grooves, in which fit two guides or slides attached to the inner diameter of the cylinder by countersunk rivets or bolts. To the said eye-pins are attached chains, which are connected above by a ring or link connected to a steam-engine or any other suitable motive-power. Motion is by this means imparted, and the bucket is actuated in the cylinder. Upon being raised a partial vacuum is formed under it, and the debris is, consequently, sucked through the bottom valves into the cylinder. A continuation of the strokes of the bucket causes the cylinder to become nearly filled, when the whole apparatus is drawn up to the surface, and can be emptied by one man, as before described, no one being employed in the pit or sump, so that by the use of this improved apparatus human life is not endangered, and the work required to be done is effected much more economically than if performed by manual labour. Besides this, the apparatus can be used in sinking and cleansing pits and sumps, where, on account of an influx of water, or the presence of quicksand, manual labour cannot be employed without risking life. The improved apparatus thus acts as and after the manner of a pump for earth instead of water, and it will work any depth under water and bring up the earth.

Another unpatented invention of interest to miners is that of Mr. J. T. FEWKES, of Philadelphia, for an improved miner's pick having a head with sockets for the reception of bits of various kinds, and set screws for holding the same firmly in position. It also relates to a wrench fitted in the handle of the pick, and concealed in the eye thereof, so that it is within convenient reach for tightening the set screws of the head, and is without danger of being lost or liability to filling with dirt. It also relates to holding the bits and sockets by wedging joints. With the eye portion of the head there are formed the bit sockets, which project in opposite directions therefrom, and on the lower sides of said sockets there are bosses in which are fitted set screws. The bit is formed with a wedge-shaped groove, and the inner face of the socket with a wedge-shaped tongue, or *vice versa*, the location of the parts being such that when the bit is fitted in the socket the tongue will enter the groove, and thus there is formed a wedging joint. In the bases of the sockets there may be placed pieces of soft metal that constitute cushions against which the inner ends of the bits will come in contact. When the said bits are properly located the screws are tightened, and the former are securely held, the cushions preventing fracture to the bases of the sockets and inner ends of the bits.

It will be seen that bits of various kinds may be readily applied to and removed from the head, and the screws form simple and convenient means for securing and releasing the bits. The bosses provide large surfaces for the set screws, so as to strengthen their hold and steady them during rotation. A portion of the upper end of the handle is removed, and in the space thus formed there is fitted and secured a wrench, which is flush with the surface of the handle. When the handle is in position in the eye of the head the wrench is concealed thereby, and does not interfere with the hold of the handle, but when the said set screws are to be tightened or loosened the handle will be readily removed from the head by a few blows, and the wrench immediately presented for service, the handle affording convenient means for operating the wrench and providing long leverage therefor. When the wrench has accomplished its work, or is not required, the handle will be restored to its place in the eye of the head, and tightened therein. It will be seen that the jaws of the wrench are covered by the adjacent wall of the eye of the head, whereby dirt will be excluded from said jaws. The wrench cannot fall out and be lost, and the miner or other operator has a wrench within convenient reach, thus avoiding the necessity of carrying or having a separate tool.

Some improvements in anemometers, or instruments for measuring the velocity of currents of air or gas have been suggested by Mr. R. M. LOWNE, of East End, Finchley. He forms the blades of the fan of vulcanite, instead of forming them of metal or mica, as has heretofore been the case, by which means he is enabled to produce a durable, cheap, and light fan, capable of withstanding the deleterious and corrosive effects of gases and impure air. He also arranges the gearing communicating with the counting apparatus, so that the latter shall be practically sealed off or protected from the entrance of dust, gases, or impure air. For this purpose instead of mounting a worm or screw on the axis of the fan of larger diameter than such axis, as heretofore, which necessitates the leaving of an open hole in the case of the counting apparatus, he either forms such worm or screw as small or smaller than such axis; or, preferably, the improvemements suggested by Mr. Lowne dispenses with the worm or screw, and in lieu thereof fixes on the axis of the fan a toothed wheel or a pinion, which communicates motion to the counting gear, thereby enabling him to pass the axis of the fan through a hole in the case of the counting gear closely fitting such axis. He also in that class of anemometer known as Byram's anemometer applies thereto a lever mounted on an axis of motion, one end of which lever acts upon suitable mechanism, as will be well understood, so as readily to throw the counting apparatus in or out of gear with the wheel or pinion on the axis of the fan.

The last invention I shall notice is that patented by Mr. P. E. GEGNON, of Paris, which, although rather less directly connected with mining, is not without interest. His invention relates to the manufacture of machine bands, ropes, cables, and fabrics for various purposes, composed wholly or partially of brass wire of any suitable gauge, which is first covered with hair or bristles, and then formed into strands, of which a number are twisted together and woven or braided into a fabric, the weft being composed of single strands, and the warp of a number of strands twisted together, or *vice versa*. The rope, cable, or fabric thus obtained is then heated to about 150° Cent. for the purpose of rendering the hair viscous and causing it to adhere to the wire. The same result may also be attained by the application of pressure and a suitable cement without the aid of heat.—*Oct.* 21. AGENT.

THE UNIVERSITY OF MANCHESTER.

SIR,—There is, no doubt, some sound argument in the two articles recently published in the *Mining Journal* in favour of the claims of the Owens College for a degree-granting charter, but still they have not been so well made out as they might have been had the writer been a member of the College, or more intimately acquainted with the views generally entertained by the more educated portion of the people of Manchester. The interest in the present movement is widely felt in the district. The funds of the College are gradually growing, and there is no doubt that a charter would stimulate very effectively the liberality of local friends and supporters. It may truly be said that there is no absolute opposition to the movement, but there are some who advocate a strong effort to reform the University of London, the defects of which are admitted, to such an extent as to render the establishment of such institutions as the proposed University of Manchester unnecessary. This is altogether impracticable, for these non-supporters fail to observe that the colleges affiliated to the University of London have no *locus* in the university—no fulcrum for their lever. In fact, to give the colleges any such *locus* would be to abolish the very principle on which that university, as now constituted, rests. Admitting the valuable functions which the University of London fulfils most university men in Manchester, and certainly the whole of the educated classes not connected with any university, would shrink from any fundamental interference with it, whatever influence in that direction they might possess, but, whilst the University of London has fully justified its existence, it must not attempt when good claims are made out to prohibit the foundation of one or two new universities for those who believe in the superior value of a connection between teaching and examining.

The contrast between the Queen's University in Ireland and the University of London is very important, the former giving its degrees only to members of the three colleges—Galway, Cork, and Belfast; the latter giving its degrees to all candidates whatsoever who shall pass its examinations. But there is this much of resemblance—the teaching staff has but little more control over the examinations than under the London constitution, for only the president of each college has a seat in the Senate, whilst the remaining seventeen members of such Senate are aliens. It is not disputed that a considerable number of candidates (non-collegiate) from Ireland seek London degrees, and it is said that the London University has been invited to hold its provincial examinations in Edinburgh. To this no exception can be taken; the principle once granted that there shall be a University offering academic honours to non-academic students, it is well that the opportunity should be given in all the leading cities for candidates to present themselves for examination, so that all capable of passing should be able to do so with the smallest possible inconvenience and expense. But what is not fair or well is that any large centre of population and intellectual activity, with an adequately furnished academic organisation, should be debarred from possessing a university of the genuine type upon the ground that the University of London covers the field, and I certainly do not understand that even the registrar of London University makes any such claim.

What progress has hitherto been made at the Owens College towards perfecting the arrangements for making the application for the university charter, of course, I cannot say, although it is asserted that much has already been done, but it is certainly not intended (except to the extent of rendering it unnecessary for the alumni of the Owens College to seek London degrees) to enter into any objectionable competition with the University of London, the main object of the originators of the University of Manchester movement being to encourage an even more "liberal provision for learning and instruction," and to diffuse more widely the benefits the Owens College is enabled to offer "by the character and extent of its staff, and by its power to stimulate knowledge and impart instruction in all branches of liberal education." H.

Oct. 25.

VAN CONSOLS.

SIR,—It may be of interest to your readers (shareholders or otherwise) to know that immediate and vastly important operations are on the eve of coming off in this enormous property—that the rich and unusually large lode (40 ft. wide) is at length expected to surrender its great wealth to the proprietary. This lode has been cut into but 7 or 10 ft., and was remarkable then for its productiveness. A good idea of its enormous riches may be formed from the fact of 2000*l.* worth of ore having been extracted from a small excavation. Delay in completing the drawing-shaft alone has prevented the

mine from making great returns. There is also plenty of ore to be found in the 15, 25, and 40 fm. levels, all ready for the miner's pick. This shaft is already completed, after much harassing disappointment, and levels will at once be driven east and west to open up the wealth which is believed to exist. Levels from the main shaft eastwards will also meet the rich ore going westward. This property may, therefore, take a very sudden and leading position amongst the giant lead adventures in the Llanidloes district. The ready response of the shareholders to an appeal for more capital is significant. The constant assertion of the manager that "the stratification of the ground is identical with the great Van Mine" must now, without doubt, be proved in a few days. I, for one, have never doubted its certain success.—*London, Oct.* 22. LLANIDLOES

SLATE QUARRIES, AND THE SLATE TRADE.

SIR,—I have spent some time in the inspection of slate quarries during this year, and after much time and very close enquiries have come to the conclusion that, as a rule, it is one of the safest and best paying branches of our numerous commercial industries. It is true that in some ill-favoured spots much capital has to be expended in what is called untopping the slate veins and opening the backs to quarry. This takes time and money, and is one of the grand points to be considered in taking up maiden ground. The next is the description of the slate rock; if that is all right (it is not always so), and can be raised in large quantity, it is almost impossible to over-rate the value of a slate and slab quarry.

The market for slates is the wide world, as there are merchants from almost every part, some waiting with money and orders for months before they can be supplied with a single cargo. I met two slate merchants who appeared in the greatest possible distress; they were ready with the money to pay down if they could only get someone to take it and let them have slates; each had contracts on hand, which they saw no way to satisfy. I was assured by a quarry owner that the demand for slates and slabs is so great, and orders on the books of the large producers so heavy, that many of them will not be able to accept additional orders during the next three years, whilst the profits, on the average, of the quarries exceed 100 per cent. per annum, and in some cases very much more. I did not forget to ask how it came about that some had failed, and found that by far the majority had broken down from the common cause—want of £ s. d. Some quarries have been opened, beginning to make money the very first day, and in a few years produced (rapidly) very large fortunes, and these successes have, no doubt, animated men of no practical knowledge, with very small means, to go into the business, and to ruin.

It is true we have thousands of capitalists who could open and work any quarry with great ease and success, but it so happens, as a rule, that gentlemen so well off are wise, and content to live without the cares and troubles of business. Hence it is that such undertakings are the legitimate and proper enterprises for joint-stock companies. I have sent this as an introduction to a series of letters I intend writing on this important subject. P. R.

Carnarvon, Oct. 23.

LONGITUDINAL EXTENT OF LODES—DYLIFFE LODES.

SIR,—While agreeing with your correspondent "Cymraeg," I think he is somewhat confused with the Welsh names of the above lodes. It is well known there are three lodes at Dyliffe. Let me for simplicity sake call them the north, middle, and south lodes. After leaving Dyliffe the north lode traverses Beguelon, Hyddgen, and on through Esgair-hir. The middle lode must also run through both these setts, but it is only to be seen at Llechweddmawr, which is the property of a gentleman largely interested in mining in both Montgomeryshire and Cardiganshire, and where an adit has lately been commenced on it, and a very fine lode is to be seen, about 2 fms. wide. As far as laid open the south lode is also to be seen in a costean pit on the same sett further south, but it is further west where it first enters Cardiganshire. It is to be seen on a mine called Drosgol (the same private property), presenting a most extraordinary appearance, being over 20 fms. wide, full at surface of a red gossan, mixed with manganese. No similar lode has ever been seen in Montgomeryshire or Cardiganshire, and Mr. Warington Smyth, a great authority, remarked concerning it that he "wondered so masterly a lode had not been given a trial," the more so that there are such facilities for driving a deep adit. No doubt the inaccessibility of the place has much to do with its being neglected, but here one day will be one of the greatest mines of Wales, though no doubt a great outlay will be required to give the requisite depth that such a monster lode will require. This is the lode that traverses Bronfloyd and other mines, where it is also of great width and productiveness, but in no place is it so wide as in the place I have mentioned.

The view from the top of Drosgol hill is very extraordinary; the River Rheidol is to be seen wending its way through a large basin about 1½ to 2 miles wide at the bottom, the sides of which are formed by Plynlimmon (south), Drosgol (west), Llechweddmawr (north), and a range of hills (east), the names of which I cannot remember. No tree or shrub, and scarcely a hut even, is to be seen, and not the slightest signs of cultivation. It is almost entirely the property of Sir Watkin Wynn, one of the most liberal of landlords, but for want of access has hitherto been untried by miners; yet it is right through this lonely vale that the South Dyliffe lode passes on its way to Camdwemawr, Bwylch-y-Styleen, &c., to Bronfloyd. I believe a good road is now being made to Hyddgen Mine, and, no doubt, it will eventually be extended to Llechweddmawr, a further distance of about a mile. It is a singular fact that notwithstanding the success of so many mines on these three lodes so little has been done to try them in any fresh place. Until Hyddgen was started there was nothing done between Cafartha and Esgair-hir on either the north or middle lodes; and until the recent workings at Llechweddmawr and Drosgol nothing on the south lode between Dyliffe and Camdwemawr, and this, too, when almost every mine started on these lodes has proved productive—Dyliffe, Cafartha, Beguelon, Hyddgen, Esgair-hir, Blaen Caelan, Havan and Henfiwch, Camdwemawr, Eaglebrook, Allt-y-Crib, Bronfloyd, and many others; and even now any new trials that are being made are entirely due to private enterprise, yet at the same time the public have thrown away their money on old mines, paying large sums for purchase-money. If mining in this part of the country is ever again to become what it once was it must be by the judicious outlay of money in new places, not but what there are some old mines now lying idle worthy of a further trial, but we must not trust too much to the discoveries of our predecessors, but strike out anew for ourselves. X. Y. Z.

MINING IN CARDIGANSHIRE.

SIR,—Having lately heard of some new mines starting in the Rheidol Valley, and not exactly knowing where they might be found by their new names if asked by any passer by, I went up throughout the district yesterday. The first I came upon, the Temple Mine, is situate immediately east of and adjoining the Aberystwith race of mines. Here the men are busily driving a deep adit level on the north side of the River Rheidol, which would be driving on the course of the lode west towards the Bwlch Gwyn and Penrhiw Mines. I saw there on Tuesday some very nice samples of lead ore just come to, and I hope they may succeed, as they have gone into it with the determination so to do. This was the old Glwyntefl. Again westward, and still west of the Aberystwith Mines, is the Ystumtean, Cyn-y-fron, and, lastly, on my present writing, the Caegynon, now known by the new name of North Rheidol. As I am anxious to speak a little on behalf of this mine, I may be permitted to do so at once, striking the iron whilst it is hot. I tried at one time, not long ago, to induce some of my mining friends to go into this mine, and but for the exorbitant demand of the landlord doubtless I should have succeeded. However, if it is not with me, it is now being vigorously worked by another good party, who, doubtless, will meet their well-deserved reward. The mine is only 70 fathoms from surface; the surface is scores of yards higher than any other surfaces in the county, the shaft actually having been sunk from the side of a very high hill, and following the run of the lode down to the valley beneath, so that the mine is really about within 20 fathoms under the bed of the river which runs by the mine. They met with but very little lead, if any, until they obtained the present depth, where they found by driving on the course of the lode east that it is worth for lead ore alone averaging from 5 to 25 cwts. per fathom for almost the length of the ground driven. Therefore to me it appears, as I have often said before, that in Cardiganshire mining depth alone will reveal all the so far hidden treasures of our land, and to have it out depth must be our aim and determination. The mine ought to pay well with the large quantity of blende they are working upon. They have an everlasting supply of water throughout the year which no one has a right to touch, and as long as the hills last they will have no excuse in their dressing performances to complain of the shortness of water, as sometimes their neighbours are obliged to do. I can go no further to-day, as I am now going off to another quarter, but hope next week to supply your wide-spread Journal with a little more news, so as to keep the hearts of our mining community in motion, and in hopes of mining being soon to start, when there shall be no more cry of war.

Rheidol Cottage, Oct. 26. SAMPSON TREVETHAN, C.M.E

WHEAL GRENVILLE, AND MR. LANE.

SIR,—At the last Wheal Grenville meeting Mr. Lane was in the chair, and proposed a vote of thanks to the manager of the mine, Capt. Hodge, remarking that "he knew no such thing as favouritism in business matters." Now, we have some allusions to a defunct mine, called Caegynon, of which we are told Mr. Lane was promoter and Capt. Hodge manager. Caegynon was a lead mine, and Grenville is a tin mine. Mr. Lane I do not doubt had good reasons for strongly recommending an agent accustomed to lead mining for what I am told is the much more difficult and important post of manager of a tin mine; but I think, in justice to himself and Capt. Hodge, he ought to publicly state those reasons. After what I have read in the Journal a little explanation would probably clear my mind of some doubts in regard to Mr. Lane's "favouritism in business matters." INQUIRER.

WAR AND METALS.

SIR,—Is Russia capable of going to war with Turkey single-handed or not? That is the question—aye or nay. We say not. On the 13th inst. the rouble notes in circulation were 104,000,000*l.*, against which the Imperial Bank held gold 17,700,000*l.*, and silver 3,800,000*l.*, together 21 500,000*l.*, and 83, 550,000*l.* less than the paper currency. It is true the Bank held 4,000,000*l.* 4½ per cent. Exterior Loan unsold, while the Times expresses its belief that in case of war Russia could not raise 100,000*l.* by way of a new loan in any other markets than Holland and France, even if obtainable there. The diminution of 11,300,000*l.* in eight-nine months has taken place in the reserves of bullion, and the circulation of Government paper is lessened fully 10,000,000*l.*, and the authority quoted deems the period of eight months sufficient to exhaust all the existing powers of Russia to meet her bullion engagements with Europe in case of war with Turkey. Surely this grasping country will pause ere she plunges into certain insolvency, and a century's misery in prospective.

A sample of copper ore from New St. Agnes produced 29 per cent. of that metal; this is one of the richest yellow sulphurets which have of late come under our notice, and hence is worthy of especial notice. This matrix, upon analysis, is found to contain 25 ozs. of silver to the ton of 20 cwts., and hitherto the whole bulk has been sold to, and the enhanced value absorbed by, smelters. This knowledge is important to incoming shareholders.

There is no question as to the growing wealth of smelters, and their encouragement of reticence in their agents; but in these days of enlightened intercourse and commercial competition it is a deplorable fact that mine agents, as a body, are as obstinate and resolute in stifling enquiry—or, in other words, "fogging the public"—as before the days of cheap postage and literature, the introduction of the telegraph, construction of railways, and the impetus given to the culture of the sciences, the arts, and of practical technical education. If Cornwall had more and many such energetic and practical characters as Captain Richard Pryor, of New Consols, copper and tin would not be the only "two metals toasted" at mine accounts, for it is the opinion of recognised chemical authorities that Cornwall loses more in the waste of silver and other high class metals and minerals than the present yield of copper and tin ores amount to.

It must be remembered that copper yield in the South West Peninsula has lamentably diminished during the current decade 1867 to 1876. Wheal Basset and Botallack have given no dividends since August, 1872. East Caradon has paid none for four years. Hingston Down has collapsed, at least for the present. Devon Great Consols has paid nothing since May, 1872, has called up 9216*l.*, and commands a market value of 25,000*l.* only—say, 50 per cent. of the value of plant. South Frances, Dolcoath, Tincroft, East Pool, Cook's Kitchen, Carn Brea, and Phœnix are changed from copper to tin mines, while South Caradon, Glasgow Caradon, West Tolgus, West Seton, and Marke Valley, are the only profitable copper mines now upon the *tapis*, while we cannot foreshadow any in the perspective unless favourable development follows at West Poldice, Penstruthal, and Cathedral. It behoves, therefore, miners to look out for silver and other metals, which the backs of copper lodes contain otherwise than copper and tin; or, probably the next decade in the history of Cornish and Devon mining will record the extinction of the product of copper.

There is no lack of intellect nor want of intelligence; energy and character abound in the hardy sons of the West. What is required is the practical direction of these attributes and qualities; the former constitute the crucible to test the products which energy discovers and brings to surface from the hidden stores of the earth, while character must yield to the requirements of the times—cease to embrace the simple toast of "Fish, Tin, and Copper," as all that is applicable to the West. Other metals and minerals must become visible in the microscopic ken of West-countrymen; then Cornish and Devon mining will again become a lucrative and attractive enterprise, and repay capitalists for the legitimate employment of capital. It is likely and important that an advance in black tin is imminent.

City United Club, Ludgate Circus, Oct. 27. R. TREDINNICK, Consulting Mining Engineer.

LEAD MINING AS AN INVESTMENT.

"Investment in Lead Mines" is the title of a little work by Mr. J. J. REYNOLDS, which ought to be read with advantage by capitalists, great or small, that are at a loss to place their money where fair returns can be obtained. Mr. Reynolds lays down two positions—that mining is more profitable than any other form of investment, and more secure than most; and that lead mining is the most profitable description of mining enterprise. The pamphlet sets out with an *expose* of foreign investments generally, asserting that home undertakings for many reasons are the most profitable and most safe. The ruinous losses by Foreign Government loans are depicted as well as the probabilities of other State bankruptcies, entailing misery upon multitudes. Even in wealthy, and in a financial point of view reputable, France it is affirmed that there exists a large class of persons anxious to repudiate the national debt, and are only deterred from agitating the subject by the knowledge that the bonds being chiefly held by French bourgeoise and farmers, they would create a terrible reaction. The author is of opinion that the financial statistics of the Russian empire, as obtained through Berlin, prove it to be temporarily insolvent, its resources being by no means in proportion to area, population, and expenditure. Of Brazil his opinion is pretty much the same. The work, in asserting that "home pays best," confines itself to mines in order to secure economy of space. It is proved that every department of British mining has yielded enormous profits, far surpassing that of any other range of industry. The firm of Messrs. John Taylor and Sons, so well known as mining engineers, have distributed 2,000,000*l.* in dividends from the mines with which they have been connected, not including connections of a temporary nature. All these mines have paid good interest, and been a source of considerable income to those interested.

The object of the *brochure* is to deal with lead mines. Mr. Reynolds concentrates his attention upon them, and elaborates his facts and arguments with patience, care, and certainty, and we think a case is made out which justifies and upholds the doctrines long taught, and the counsels for a long time given, in the columns of the Journal. We can only find room for a single specimen of the way in which Mr. Reynolds treats matters—"Foreign mines are difficult of access. The laws of the countries in which they are situated may render the investment insecure; the customs of the inhabitants may make life unsafe; the climate may kill or disable; they are so remote that designing agents might impose false accounts of the workings, and false reckonings of the expenditure, upon the holders of the shares at home. But the British mine is always accessible; it is worked under the laws we make; the means of investigating its position (material or financial) are open; and it is simply the investors own fault if he do not, under competent advice and guidance, investigate all matters for himself." Thus, although various foreign mining adventures are great successes, he thinks British mining ranks first.

THE COMBMARTIN MINE.

This mine is situate in the parish of Combmartin, in the county of Devon. In addition to a large extent of undeveloped mineral ground, it comprises the Old Combmartin Mine, which was wrought in the reigns of Edward I., Edward III., Henry V., and Queen Elizabeth. There are five lodes parallel to each other in the sett, and all of which have been wrought upon to some extent, and from which large quantities of lead have been returned. The principal operations, however, were upon the main lode, and it is said that the ore made up to the surface in great strength and was rich in silver, and great profits were realised. In 1835 the mine was re-worked, and upwards of 60,000*l.* worth of lead was raised. As will be seen from the following extracts from various reports, the main lode was wrought upon, and was very rich up to a cross-course, which has heaved the lode, but beyond this point nothing was ever done by any of the former workers. The object of the present company is to explore the undeveloped ground into which the main lode has been heaved, not only with a view to the development of this lode, but also to the working of the other lodes which also traverse the ground. It is considered that a very small outlay will suffice to discover the position of the lodes, and to ascertain the most suitable spot for future operations. Upon one of the parallel lodes, intersected by a cross-cut from the main lode, a shaft is sunk to the adit (28 fms.) A good deal of rich ore was raised from this lode by the former workers, although the lode was only driven on for a few fathoms. This shaft can be cleared for a small sum, and when effected it is believed that tribute pitches can at once be set in lead ore. The mine is in 6000 shares, and any further information may be obtained of the secretary, Mr. John Watson, 79½, Gracechurch-street, London, E.C.

Mr. JEHU HITCHINS thus speaks of the property:—"There are five east and west lodes within a distance from north to south of 250 fms., on all which lead ore rich in silver has been gotten more or less. The main lode is, however, for the present more the great object in view, and looking at the sections and seeing that a deal of other very extensive and expensive works, such as cross-cuts, repairs of old adit, and sinking Vivian's shaft were completed so far, and in addition to those, the large dividends having been made therefrom, I should say that this lode never had a fair chance shown it, and that if the levels had been fairly extended south-east and north-west, and part of the profits applied thereto, instead of being distributed in premature dividends (I fear to effect sales of shares at a high rate), I have a very strong presentiment that the mine could be working up to this time. The situation is good, having only half a mile of land carriage from and to the quay for imports or exports. The port also is convenient to the coast of Wales, which is only 21 miles across, where coal can be had cheap and good. Such is my opinion of this property, that I can scarcely call it an adventure, but more an investment to pay in due time a heavy interest for capital employed therein if conducted with systematic and energetic economy."

The directors and purser of the last company that worked the Old Combmartin Mine state:—"As directors of the late Old Combmartin Mine we have much pleasure in saying that we believe a further prosecution in new ground will probably be attended with success. Our operations were not suspended on any demerits of the mine, and we wish prosperity to a new adventure."

Capt. RICHARD MOORCOM, managing agent of the late Old Combmartin Mine, says:—"Understanding it is proposed to form a company, having as one of its objects the exploration of the ground south-east of our late workings, where we had very fine courses of ore, I think it very probable that deposits of ore similar to those which were found in the old mine may there be discovered."

Capt. ROBERT ROBINS, the underground agent of the late Old Combmartin Mine, says:—"I was employed in the mine many years. The late company's operations were suspended in consequence of a cross-course making its appearance, and which there is every reason to believe hove the old rich lode, as invariably happens. This is readily to be ascertained, and I believe the proceeding will be profitably successful."

Capt. WM. TRELEASE says:—"I was employed in old Combmartin Mine in the brightest of its days, and notwithstanding my long experience in lead mining at home and abroad I know of no concern more worthy of development. I have seen the lode worth from 50*l.* to 200*l.* per fathom, and at one point twice that amount. On this truly splendid lode upwards of 60,000*l.* were returned from the 27 to below the 100 fm. level. In my judgment there yet remain undiscovered similar masses of ore in close proximity, the ground never having been yet half tried or laid open. In my opinion the heaves in the old Combmartin lodes caused by the cross-course at either end of the ground will be found on proper trial to be right-handed ones, and the results rich, as the ore having made home to the heaves where proved, the same may be expected on the other side."

Mr. WM. NEWTON, for 10 years secretary, dialler, and mapper to the late company, says:—"The lode was never prosecuted sufficiently to find the continuance of the ore beyond the cross-course, though from general analogy derived from other mines I am quite satisfied it will be found some day equally rich as before. The courses in the mine were large, and very free from waste, and the ground easy to yet through. I have assayed Fahler's ore upwards of 1200 ozs. of silver per ton, the average ore being 62 ozs., which is unusually rich. I have seen a rock of ore which fell from the backs, and which after being dressed weighed 10 tons 14 cwts., and would now sell for 28*l.* to 30*l.* per ton for silver-lead."

UTILISING FIRE-DAMP.—By means of a hood, bottomless cage, or air-tight chamber, Mr. R. J. BLEWITT, of Norwood, proposes to collect the gas naturally emanating from coal, and by any kind of aperture with tube and stop-cock let it out at once into a gas-holder, from whence it may be conveyed to its intended destination in pipes of iron or bamboo (if he thinks fit to adopt the latter mode of conveyance according to the manner of the Chinese). In order to render the gas innocuous in a coal mine, he proposes to extract it by means of a bore-hole and tube on the principle of that used for an artesian well, the tube to be 2 in. in diameter, and extending from the deepest part of the coal intended to be worked to such a height above the surface of the ground as may be possible or desirable. He proposes to obtain and increase the quantity of cyanogen and ammonia by promoting the separation of the nitrogen from oxygen in atmospheric air, and the decomposition of the hydrogen and oxygen in water, and by the decomposition of such elements. Instead of converting the sulphur usually contained in coal, as iron pyrites or sulphuret of calcium, into hydro-sulphuric acid gas, he extracts the former by promoting and awaiting its decomposition and natural re-arrangement in strata, as described in a work on gas, published by Mr. Samuel Hughes; and as to the latter, he converts it by means of chloride of sodium, obtainable by the boiling and evaporation of sea salt into sulphuret of sodium, one of the principal ingredients for producing an artificial lapis lazuli, or ultramarine. As the sulphur separated from the iron pyrites will be in a state of great purity, he disposes of it as a marketable commodity, and the iron or magnetic waste of

iron also. As to all the products arising from the distillation of coal, he produces them in the usual manner, but with far less expense, and without any of the offensive odours which accompany the present system.

LECTURE ON METALLIC MINERALS—THEIR PRODUCTION AND USES.

A public meeting in connection with the Colchester Science and Art Classes was held on Wednesday, Oct. 18, at the Town Hall, when a lecture was delivered by Mr. J. YELLOLY WATSON, F.G.S., one of the County Magistrates, on "Metallic Minerals, their Production and Uses." The prizes and certificates gained at the Examinations of the Science and Art Department, South Kensington, in May last were also distributed to the successful students.

The MAYOR (Mr. P. O. Papillon) occupied the chair, and the meeting was the largest and the most enthusiastic, he afterwards said, that he had ever presided over.

After distributing the prizes to the students, the MAYOR called upon Mr. J. Y. Watson to deliver his lecture on a subject which, he said, everyone connected with Colchester, and the Museum especially, would be pleased at his having selected. They were probably aware that they possessed one of the most valuable collections of minerals that any museum possessed, and that they were indebted for it to Mr. Watson himself. (Applause.) Mr. Watson went so straight, was always so happy in describing anything either "in the saddle" or "out of the saddle"—(laughter)—that he was sure his lecture would be both interesting and instructive; and he hoped one practical result would be that at some early future year a fourth subject would be selected by the students—viz., metallurgy.

Mr. WATSON then proceeded to deliver the following lecture upon—

METALLIC MINERALS—THEIR PRODUCTION AND USES.

Mr. Mayor, Ladies and Gentlemen, and Students,—In whatever business or occupation of life you may engage, or may be at present engaged in, the use and adaptation of metals must of necessity come constantly and prominently before you. When, therefore, I had the honour of being invited to address you this evening, it struck me that a few remarks on the mineral wealth of our own country—showing how it was first discovered, and how a few of the principal metals are obtained and utilised for manufactures and commerce, might be, as I hope they will prove, both interesting and instructive to you. To enter fully into such a subject, in all its various details, would be beyond my powers this evening, or your patience. And even its salient points must be condensed as much as possible.

An old writer once said that the discovery of iron was the dawn of civilisation; for without it we could neither have tools to work with nor could the arts and sciences be carried on. And in the present day metallic substances form the basis and and enter into the composition of nearly all of our useful and artistic manufactures and designs; just as the crude ores from which they are obtained formed the basis as well as the chief articles of commerce noticed in the earliest history of our country.

The use of metals was known in very ancient times. Tubal Cain, the son of Lamech, we are told, was the first artificer in brass, which, in those days must have been copper; for brass as we know it is a a mixture of copper and zinc, and zinc was not discovered till the sixteenth century. Moses wrote of "the gold, the silver, the brass, the iron, the tin, and the lead;" but it was not till about 500 years before the Christian era that metals became an article of commerce in our own country. For centuries before that time the inhabitants of Cornwall had used brushwood and turf as fuel, and in digging for peat they found tinstone, of the properties of which they knew nothing, and as they left it exposed, successive floods washed it from the different veins into brooks and rivers, where valuable deposits accumulated, and were found by the Phœnicians when they landed on the coast, more than 2300 years ago, The Phœnicions knew the value of this tin, they collected it from the moors, traced it to the veins, and opened up a commerce which soon extended over the greater part of the whole world.

But even the Phœnicians, long after mining operations had been established among them, do not appear to have understood the value of the ores of copper, and when they found a vein of it they passed it by; and it was not until 1691 that copper discovered in tin mines was regularly worked in Cornwall; and a charter in that year was granted to Sir Joseph Hearn, and other merchants of London, for purifying and refining copper. In 1717 money was first coined from English copper. In 1762 the first brass-works in the kingdom were established at Bristol, previous to which time, our copper tea-kettles were imported in large quantities from Holland.

To show you the vast importance of our mineral productions to the arts, manufactures, and commerce of the country, I may mention here that the *annual* produce of the United Kingdom exceeds in value *sixty millions sterling*. The last Government return made up, which is for the year 1874, gives the total production for that year, including coal and earthy minerals, at 67,834,313*l*. To produce this enormous amount of mineral every year requires not only a vast expenditure of capital in machinery and labour, but the greatest engineering energy and skill; and I will now proceed to show you, as briefly and plainly as I can, how it is done.

Metallic veins may be described as cracks in a rock, and in these irregular cracks and crevices Nature has deposited her mineral wealth, not, however, by itself, but mixed up with different kinds of earthy matter, according to the nature of the rocks in which it is found. This is called ore. The average production of tin ore is little more than 2 per cent. of tin; copper, 5 per cent.; lead, up to 80 per cent.; so that to get 2 tons of black tin 100 tons of stone have to be stamped to powder, and then burnt to free it from sulphur and arsenic, before it is sold to the smelter, who reduces it to the white tin of commerce; 100 tons of average English copper ore may yield 5 tons of copper, and the ore, after being cleaned and dressed by hand, is sent to Swansea to be smelted into ingots and bars, because it is cheaper to send it to the coals than to bring the coals to the copper.

How the mineral got into the crevices of the rock has long been a disputed question. Some say from fire or great central heat; others, from water; and there are many circumstances known to us in the present day, but which were not known to the ancients, to favour the water theory. Most of the water pumped from metallic veins contain mineral in solution. I have myself put the blade of my knife into water as it was pumped, clear as crystal, from a mine, and in a few minutes it has been the colour of gold from the copper deposited upon it; and at the present time many hundred tons of copper are obtained by pumping water into tanks filled with old scrap iron; the copper leaves the water, settles upon the iron, and forms copper precipitate, which sells at 10*l*. or 20*l*. per ton, while the old iron costs about 2*l*. 10s. per ton. The explanation of this is, that the water contains sulphate of copper—that is, copper in combination with sulphuric acid, and the acid having a greater affinity for the iron is attracted by that metal, and deposits the copper upon it. Again, in regard to the water theory, all the best mineral veins are found in the immediate vicinity of veins of clay, which cross and intersect them; and, in relation to this part of my subject, I will mention a circumstances I once heard Mr. Nasmyth, the inventor of the steam-hammer, relate at a meeting of the Geological Society of London, many years ago. He remarked that if you poured hot molten iron from the furnace into an iron cauldron, the latter would be melted by the great heat; but if you line the inside of the cauldron with a coating of clay, and then pour in the hot liquid, you may put your hands outside the cauldron, and not feel inconvenienced by the heat. Thus clay, you see, is a great non-conductor of heat. When I heard this illustration from Mr. Nasmyth, it struck me very forcibly in regard to the water and electrical theory of the formation of mineral veins, which is that strong currents of electricity pass through them all, and that the clay-cross veins, against which the mineral is found, stop these electrical currents, and the mineral held in solution by the water is condensed and disseminated through the cracks and crevices of the surrounding rocks. This theory of electricity might also explain in some measure the effect of the divining rod, by which, in ancient times, the professional "dowsers" found out mineral veins and streams of water.

In olden time the saying in reference to a mineral vein was this, "Where 'tis, there 'tis;" and this sort of hap-hazard search led to much useless expenditure and loss. And although at the present day science, and a better knowledge of geology, have done much to improve the art of mining, mineral veins may still be described as among the most erratic and uncertain things *under* the face of the earth. They seem to be governed by no certain or defined laws, and to take no certain or regular course, either of direction or affinity. As an instance, I remember, more than 30 years ago, there was a copper mine in Cornwall found in a huge basin of granite, surrounded by an undercrust of killas, or hard clay-slate. Out of the basin or bed of granite copper to the value of more than half a million sterling was obtained, but whenever the vein touched the slate it split up and became valueless. The richest parts were found at a short distance from the junction of the two rocks. This naturally led miners in those days to suppose that copper could only be found in granite, and they neglected other rocks. Yet, a few years afterwards, an equally rich mine was found 40 miles off, wholly in clay-slate, and here it was rather extraordinary to find the vein became impoverished wherever it touched the granite. And I could, if time permitted, give you some very extraordinary instances of the vagaries and uncertain character of mineral veins.

There is one thing, however, which has been reduced to a certainty, and that is, that no profitable metallic vein has ever been found in primitive granite or moorstone, such as we find on high hills in mining districts; though at the sides of these hills, where a softer granite prevails, minerals are found.

The appearance of some mining districts is very barren and very peculiar, and I do not think I can describe them to you better than by giving a short extract from a small work I wrote many years ago when making a tour through Cornwall. "I am writing this," I said, "on the summit of Carn Camborne. Before me the blue sea and the 'richest' panoramic view in the world. By 'richest,' however, I do not mean in beautiful and verdant scenery, such as a novelist would describe, for between the Bristol Channel and where I sit, I see nothing as far as the eye can reach from east to west but parched and barren ground, little mountains of rubbish, and tall dark stacks of engine chimneys. I see, in fact, the richest mineral district in the world lying at my feet. I am looking upon mines from which scores of families have been enriched, and many beggared. From up these dark shafts men have come as working miners, with newly-found 'mineral' in their pockets, the 'forerunners' of fortunes, which have made their descendants in some cases the largest landowners in the county, and in others men of mark, of rank, and title. And even now, as I look upon the apparently quiet scene, and watch the heavy beams of the engines work lazily up and down, thousands upon thousands of men are burrow-underground like moles, some seeking an *ignis fatuus*, others working by the light of a farthing candle the uncertain veins; and as they work enriching others if not themselves." Now, the group of mines referred to as lying at my feet as I then sat on the top of Carn Camborne had yielded minerals—chiefly copper and tin—to the value of *forty millions sterling*.

But though rugged and barren, the owners of such land as this often reap a rich harvest without sowing and without labour or trouble. The owners of the soil, in fact, get what is called a "dish," dues or royalty upon other men's labour. They grant leases and get 1-10th, 1-12th, or 1-15th, as the case may be, of the gross value of all the ores brought to surface by the working bees. Thus, if miners get in a year ores worth 15,000*l*., they make it marketable, sell it, and hand over to the landowner 1000*l*. free from all deductions, supposing the royalty to be 1-15th. In addition to this, the landlord gets at the rate of 100*l*. per acre for all land taken for erecting engines, and depositing attle or rubbish; this is called "surface damage," and is paid for land that in many cases would not be worth 5s. per acre for any other purpose.

In our own county of Essex the rich and luxuriant soil fertilises near the surface, and is comparatively valueless in depth. Tap the hard barren rock of a mining district and a mineral produce is found, without which our corn could neither be cut, harvested, or made useful to us. Such is one of the great and compensating balances so often found in a study of the great and wonderful works of Nature. If mines had been regularly distributed over the whole earth, and near the surface, it would have been rendered unfit to produce food for cattle or grain for man.

While on the subject of royalty and the value of mineral land, I will relate to you one or two extraordinary circumstances. Many years ago, an old miner wandering in a wood belonging to the Duke of Bedford, near Tavistock, found an outcrop of gossan (which is a mixture of oxide of iron and quartz, invariably found on the top of mineral veins), and thinking he had found a prize, he began to sink a pit upon it, but in doing this he frightened the Duke's pheasants, was ordered off the ground, and the place was neglected for years. In 1844, however, a descendant of the old miner examined the pit, and got a license from the late Duke to open it. He was joined by a few capitalists, among them two of the partners of a gentlemen who had at one time represented Colchester in Parliament, and they subscribed 1000*l*. among them as working capital. Well, from 1845 to the present time that pit and a line of others through the wood on the same vein have paid the Duke of Bedford 251,888*l*. 17s. 4d. in royalty or rent, a fine 20,000*l*. for a renewal of lease, 2052*l*. for land destroyed, and 840*l*. 19s. 11d. for timber removed.

I was on the spot in 1846, when there was scarcely a building or a cottage in the wood. I went there again many years afterwards and found the place a little town. And from 1845 to 1872, besides the royalty and the other sums I have named as paid to the Duke of Bedford, these miners paid 1,352,310*l*. 7s. in labour; for steam engines, water-wheels, timber, iron, and almost every kind of machinery, they paid 362,970*l*. 18s. 10d.; and last, though not least, they divided from the old pit in the wood among themselves as profit 1,186,816*l*.

I was first on the property, as I said, in 1846, and as something then happened which in a manner illustrates my theory as to mineral veins, I will add that this great discovery of copper was near the eastern boundary of the Duke of Bedford's estate, and I joined a few friends in sinking a pit on the other side of the hedge, in a neighbouring property, and where, according to all human probability, we considered the vein *must* continue; *but it didn't*. We spent some thousands of pounds in the search and never got an ounce of copper in return, and the reason was only found out a few years later, when it appeared that the enormous deposit of copper ore on the Duke's land had been formed against a large cross vein of clay. The electric current, or something else, had warmed up the Duke's side, but left no such deposit on the other.

This Devonshire mine may be said to be the most extraordinary in England, as the Parys Mountain, in Anglesea, was the most extraordinary in Wales, or perhaps in the whole world. The latter apparently barren mountain belonged half to Sir Nicholas Bayley, and half to the Rev. Edward Hughes, a Welsh clergyman. The former gentleman was desirous of possessing the whole mountain, and the story goes that Mr. Hughes went up to London to negociate with him for the sale of his half. He knocked at the great man's door, and the magnificient flunkey who opened it treated the humbly-clad old man with such disdain that the pride of the Welshman was aroused; he turned upon his heel, and went back to Wales. And lucky it was that he did so, for shortly afterwards, that is on March 2, 1768, copper ore was found near the surface of the mountain, and the place turned out to be a very mountain of copper. From one great open cutting, three-quarters of a mile long, several hundred yards wide, and about 120 yards deep, copper to the value of five millions sterling was obtained. Sir Nicholas Bayley's son was created Earl of Uxbridge, and his grandson Marquis of Anglesea; Mr. Hughes' son, who also became enormously rich, was created Lord Dinorben. I have myself made a study of this mountain of late years, and a very interesting experiment is now going on there, partly under my own direction, and that is, to tap the mountain 60 yards under the great deposit of copper. This could only be done by driving a gallery, which has been some years in progress; but what the result will be no one can tell—I wish it could.

When an ordinary mineral vein is found it is worked by means of shafts, winzes, and galleries, or levels. The latter are driven every 60 ft. that the shaft is sunk, and the winzes, or small intermediate shafts, connect the different levels, to give ventilation and open out the vein, so that the mineral can be taken away in the easiest and least expensive way. Shafts, some of which are sunk to a depth of more than 1000 ft., cost, according to the hardness of the rock, and the quantity of timber used in casing and dividing them, from 4*l* up to 20*l*. per foot; so that it is a matter of vast importance to begin them in the right place, which is not always possible. Copper and tin veins, as a rule, run east and west, and dip into the earth, like the slanting roof of a house, north and south. Lead veins run both ways and dip accordingly.

In sinking shafts and driving levels, the workmen are paid by the fathom of 6 ft., the price being calculated so as to give each man an average pay of about 4*l*. per month. The ore between the levels or galleries is worked or taken away upon what is called a "tribute." Six men, for instance, take a portion of a vein, called a "pitch," to work for a month, or other fixed time, or for so many fathoms high and so many long; and they get for themselves 10s. or more, as the case may be, in every poundsworth of ore they bring to the surface. They are allowed powder, candles, and other materials, at cost price during their work, and the price of these is deducted when the ore is weighed and sold, and they receive their proportion of its value. There is a great deal of excitement and speculation in this sort of work, and many a working man, commencing as a "tributer," has ended a mineowner. When the ground is set to tributers, it is let to them at the value it then presents, and calculated so as to give them the usual monthly wages; but a single stroke of a pick, or a blast of gunpowder, has sometimes revealed fortunes, and before many days the tributer may get into a vein ten times richer than it was when he first took it, but he sticks to his "pitch" as long as it lasts, and receives his original proportion of whatever it produces. I once knew a small gang of tributers in this way make 1200*l*. by their pitch, when at starting they expected to get about 30*l*.

When copper ore is raised to the surface it is chiefly dressed by hand, and at many mines two or three hundred boys and girls may be seen sitting or lolling on benches in sheds, chipping off the bits of rock or other matter from the ore, and singing merrily as they work. They throw the ore into barrows, and it is taken to a crushing mill, broken into small bits of the size of a nut, and laid out in parcels for sale.

When a farmer sells his corn he takes a sample from the bulk and sells by it. When a miner sells his produce the buyers take the samples for themselves, which they put into crucibles, melt, and assay, and according to the "produce," or percentage, so they bid for it. For instance, if a sample of ore shows a produce of 5 per cent. of copper, and the price of that ore is what is termed 15s. per unit, or one of produce, he multiplies 15s. by 5, and bids 3*l*. 15s. per ton for the ore. On a certain day, generally once a month for each district, there is a public gathering (and always a good dinner) called a "ticketting," when buyers and sellers meet, the former put in their "tickets" or bids, and the highest bidder for each lot gets it. In this way, from 50,000*l*. to 100,000*l*. worth of ores have been frequently sold in a day. The ores are then shipped to Swansea to be smelted into ingots, &c.

The uses of copper, as copper, are various and important, as you all know. In combination with one-third zinc, it becomes brass; with tin, it forms bell-metal and bronze; with acetic acid, verdigris; and with sulpher, blue vitroil.

Tinstone, which is raised much in the same way as copper, has to be stamped to a fine powder. The stamp heads, which are heavily laden with iron, pound away in small boxes, having in front a copper grating almost as fine as muslin; a continuous stream of water is then let in at the back of the box, and the stone, as fast as it is crushed into powder, is forced through the grating into pits prepared for it, and the tin being the heaviest, settles at the bottom, while the *debris* is washed away as slime, to be re-dressed at another opportunity. After this, the powdered tin has to be burnt in horizontal chimneys to get rid of arsenic and sulphur. The dressing of tin, therefore, is a very expensive process, and it is calculated that to raise it from the earth, dress and prepare it for the market, costs from 40*l*. to 50*l*. per ton; it is then sold to the smelters, who make it into the white tin of commerce. Prior to 1838 all the tin raised in Cornwall paid a duty of 4s. per cwt. to the Duke of Cornwall, and in this way George IV., when Prince of Wales, received as much sometimes as 30,000*l*. in a-year.

Tin ore is generally found in secondary granite, or in very quartzose or micacious clay-slate, and goes down to a great depth. The deepest tin mine of the day (and it has been worked now for 100 years) has a shaft down about *seven hundred yards* from the surface, and the cost of working it is in labour alone nearly 30,000*l*. a-year. Many years ago the men were nearly exhausted in getting to and from their work, by descending and ascending ladders for such a tremendous depth, but now, they have "man engines," like the lifts you see in tall buildings which take them down and bring them up at stated times, stopping on their way at every level of 60 ft.

Tin has various uses. I need not describe to you how useful it is for pots, kettles, and pans; but I may tell you that many hundreds of tons are used annually for dyeing purposes. This particular tin is "granulated" in its manufacture, and it indelibly fixes the colours in silks and satins.

Lead mines are chiefly found in the limestone formation, and are worked in the same way as tin and copper. The veins, when not of pure galena, are intermixed very freely with "blende," or one of the ores of zinc, which has to be separated from it in dressing.

Galena, or the commonest of lead ores, averages about 80 per cent. of lead, and contains a small proportion of silver. Silver-lead ore, which is harder and more compact, has sometimes from 30 to 50 ozs. of silver to the ton. In 1874 the silver extracted from lead ores in the United Kingdom was 509,277 ozs., valued at 127,319*l*. In former times the silver was not extracted from the lead, and for this reason, very old lead found on the roof of churches and old buildings is far more valuable than new, as a great deal of silver may be got from it.

Lead with half its weight of tin forms *solder;* with a quarter part of antimony it forms metal for printing type; mixed with a small quantity of arsenic it will run into drops, and from this composition shot is made. Sheets of lead rolled up and placed under vinegar become covered with *white lead*, or the ceruse used for paints; dissolve this in acetic acid, and you get sugar of lead.

In all metallic mines I have thus far referred to water is very troublesome and expensive to overcome. In the Consolidated Copper Mines of Cornwall the levels or winding galleries were 60 miles in extent, and 10 or 12 large steam-engines had to be kept going day and night to pump out the water and allow the miners to work. Very few shafts can be sunk anywhere, beyond 30 or 40 yards, without steam power, and as an ordinary engine consumes about 1 ton of coal a-day, the water charge is a very serious item in all underground operations.

I remarked at the commencement of my address that the discovery of iron had been described as the dawn of civilisation, and marvellous are the uses to which we have seen it applied in our own times. We have seen new towns spring up, new trades and employments created, and the old habits of business, and even of ordinary life, revolutionised by the "iron horse." There are many of us here to-night who had we been told 50 years ago of the wonders that the steam-engine and the iron rail would do, not only in developing the extraordinary engineering talent of the age, in the impetus they would give to every kind of labour, ingenuity, and skill, in the new ideas they would give us, and the changed habits of the people they would bring about, we should have looked upon the tale as the wildest romance. But the changes that iron has produced, more wonderful than anything we could then have conceived, are in evidence around us daily, and we have ceased to regard them with wonderment, and perhaps to value them as we ought. But when we consider that iron, without which none of these wonders could have been accomplished, is the most abundant as well as the most easily obtained of all metallic minerals, we have further evidence that there is nothing that the ingenuity or talent of man can conceive or put into practice for the general welfare but he will find the materials stored up and amply provided by an all-wise and omnipotent Creator.

Iron has been wrought in this country from a very early period.

It is found in all soils, disseminated through all kinds of rock, and found in quarries that are easily worked. In the Forest of Dean iron was known as early as 1066, but the working of it was stopped for a time by Act of Parliament in 1580, in consequence of the great consumption of timber used in smelting it. Soon after this Lord Edward Dudley invented the process of smelting with pit coal instead of charcoal. And it is a somewhat singular circumstance that in the year 1239, about 70 years after a charter had been granted to the town of Newcastle for the "digging of coal," taking it to London was forbidden, because its use interfered with the burning of wood, and was, therefore, injurious to the owners of the woods near that City, and from which it was supplied with fuel.

When smelted iron may be described as cast or pig-iron, wrought or malleable iron, and steel, the latter being refined iron combined with carbon. Plumbago, or blacklead, from which pencils are made, is a natural compound of iron with a large proportion of carbon. Many of our most precious stones, such as the ruby, amethyst, turquoise, garnet, and cornelian, owe their beautiful colours to the oxide of iron.

I fear that I have now trespassed too long upon your patience, and will only add, in conclusion, that it is close upon 40 years since I commenced to write my first book upon the subject I have brought before you this evening. Since that time I have had some little practical experience in the fascinations, the uncertainties, and the vicissitudes that attend the search for the mineral treasures of the earth; but there are a few lessons which such work teaches applicable to every pursuit, and I would commend them to the serious attention of you all. Never be disheartened by temporary failures, or unduly elated by temporary success. In whatever you undertake to do study it thoroughly, and then pursue it with an earnest and steady perseverance.

At the conclusion of the lecture, the delivery of which was several times interrupted by applause, Mr. J. B. HARVEY, J.P., rose to propose a vote of thanks to the lecturer, who, he said, in addition to presenting the Colchester Museum with a very valuable collection of minerals, also wrote a very useful handbook or guide to the collection, which people would do well to have in their hands when examining the various specimens. When the committee in connection with these classes had the question under consideration as to how they could best contribute to the interest and also to the instruction of that evening, it occurred to them that if they could secure the services of Mr. Watson for a lecture they should confer a favour on the audience, and obtain a great deal of useful instruction. The committee owed a great debt of gratitude to Mr. Watson for so kindly accepting their invitation to deliver a lecture that evening, and he thought they would all agree that the committee were exceedingly fortunate both in their choice of a lecturer and in the result of their invitation. He did not think the distribution of prizes and certificates that evening could have been followed by a more appropriate address than that to which they had that evening listened. The lecture had been fraught with instruction, it had been delivered in a style which he was sure must have contributed very largely to the easy acquirement of knowledge, it had been a thoroughly practical lecture, and he begged to move that their hearty and cordial thanks be accorded to Mr. Watson for the treat he had given them.

Mr. DAVEY: I have much pleasure in seconding the vote of thanks to our talented lecturer to-night.

The motion was carried with acclamation.

THE WILD DUCK, OR SPORTSMAN'S ARMS,

"Now, comrades," says Uncle Henry Treylon, "I shall be ready for a bit of discoose with ee, but my old pipe is chucked, and I can't make un light. I wish, Jan, thee's go out for Becky's broom, and find a good long griglon to clear the chuck." Jan soon found a griglon, and Uncle Henry's old pipe being made to draw like a puffer-engine, Uncle Henry said—"Now look here, sose, the question was axed in our last mitten where wor the Camborne lodes going west? Now, look upon un to be a brave run of lodes from Carn Brae to Wheal Nancy, taking in Tin Croft, Cook's Kitchen, Dolcoath, Stray Park, and Camborne Vean, and I spose a better run of lodes wor never found. I want to know where these lodes are going west? From Redruth Church-town to Gwinear Church-town is a brave long stretch. The Camborne lodes must run through Gwinear, and I want to know the reason, if there is one, why they lodes are not so good in Gwinear as in Camborne. Now, tell me this, comrades, and I'll thank ee so long as I live; and say, too, if you believe there is an end or bottom to a lode; becase if there esn't, why es it that a lode es not so good in one place as another?" After a pause Jan Temby remarked—"I can only say, as I stated last mitten, that tes fine pussle easier to ax than to answer questions, but my opinion is like this here—that there is no end or bottom to a lode, for in going through some rocks a may be squeezed as small as a hair of your head, but a will go through in length and depth till a do mit with better treatment, and got power to breathe again, and depend upon un, men, tes the rock that make the ore, or else lodes would be rich in one place as well as another. I'm sure you never see'd a crop of corn growing out of a pile of spar stones. No more would ee see copper or tin in some rocks. The earth must be manured to bring forth crops, and the different rocks act in the same way to bring forth minerals. Spose, now, you know a fine piece of clean, purty killas ground ten miles square, with lots of lodes running thro' un; do ee think you would find much mineral? I tell ee you wouldn't, for without elvans, greenstone, ironstone, cross-courses, and fluccans, and all the there things as feeders (manure if tis more plain to ee) to the lodes, a plain unbroken piece of ground will be no more good for mining than a pile of spar stones for growing corn." "Well, now," says Jan Jewill, "I think, Jan, there is a good deal of reason in what thee hast been saying, and I don't know the man that can say it tesn't so." "But I want to know," says Jemmy Down, "that if the great run of lodes can be traced from Carn Brea through Dolcoath to Gwinear, if the are the same lodes running all through, for in that there run how many cross-cooses, and slides, and hosses of ground will ee find splitting, heaving, and tossing about the lodes in all directions, and do ee mean to say the be the same lodes?" "Iss, I do," says Jan Temby, "for the same lodes may be traced miles east and west of the places we've been taalken about, and the man that says becase a lode is heaved by a cross-coose, or split by a hoss, is not the same lode, but another, es so big a buffle-head as Jimmy Eastes, and he chased a 'King George' butterfly one day from Newton Moor to Ting Tang, and miss'ent after all." "I have listened, men," says Cousin Will, "with a great deal of pleasure to your conversation, and I have observed from long experience that every thorough practical miner, although he may express his ideas in homely provincial terms, is a practical geologist; he may not even know the meaning of the word 'geology,' and yet he reduces the science to practice by keen and constant observation and comparison of rocks in his daily employment. I need only, in proof of this, refer to Jan Temby's remarks. I very briefly, at our last meeting, referred to the fine run of 'virgin mineral ground' to the west of Old Polgive, and in addition to the places named there is Carwynnen, Plantation, Rocks, &c., then Trevoole, Germick, and Blackrock, all embracing a number of champion lodes, and in all this district I have not observed any moorstone granite, but granite proper for minerals, fine elvans, killas, and all the rocks in which minerals occur. Before we part I would say a word about granite, or granites. There is moorstone; there is granite; there is growan; there is growder. We are told that granite is the primitive rock, but there can only be one, and not four primitive rocks. The four granites I have named are different in appearance and composition, and were evidently formed at different periods. We may, therefore, ask which was formed first, and which last, for most certainly they were not all formed at the same time." "That," says Uncle Henry, "es what I coal a grand discoose." "So a ess," says Jan Jewill, "and here's good health and long live to ee, landlord." Old Tom here told the following story about old Capt. Joe and Jimmy Bartle. "Jimmy was put to fill up some pits near a road, and Capt. Joe noticed that Jimmy never took off his jacket to work. At last Capt. Joe said—'How can you do proper work with your jacket on?' 'The truth es,' says Jimmy, 'my shirt is in rags, and I'm ashamed to take un off.' 'Poor fellow,' says Capt. Joe, 'here's money to buy a new shirt.' Well, Capt. Joe watched Jimmy, and found after he had the new shirt he still kept on the jacket, and one day Capt. Joe in a passion said—'Thee'rt a a lazy fellow, and it takes half of my time to watch thee.' 'Iss,' says Jimmy, and it take all my time to watch you.'" "Well," says Jan Temby, "that's like Wheal Scat, where they've got two capns and a clerk looking after four men."—*Cousin Jack's Unpublished MS.*

Meetings of Public Companies.

CHICAGO SILVER MINING COMPANY.

The fourth ordinary general meeting of shareholders was held, on Wednesday, at the offices of the company, Finch-lane,

Mr. T. E. BRIGGS (the secretary) read the notice calling the meeting, and the report of the directors, which has already been published, was taken as read.

The CHAIRMAN said that at the last yearly meeting he expressed a sanguine hope and expectation of the future success of this company. It was not often the directors had it in their power to refer to the full realisation of their expectations, but on the present occasion he might venture to say that not only had their anticipations been fulfilled, but there was every reason to believe that during the ensuing year the profits would equal, if not succeed, those of the past year. (Hear, hear.) The position of the company was fully set forth in the report of the directors, and those who had read that report would see that the business of the company had been a progressive one, and in consequence of their having acquired the command of the ore from numerous mines the company was now in a stronger position than it had been heretofore, and owing to the failure of the competition for smelting that branch of the business which dealt with the smelting of purchased ore was likely to be more profitable than it had been in the past. Mr. Godbe, the manager, estimated the loss from that competition during the past year at 10,000*l.*—an estimate which he (the Chairman) thought was somewhat high, but at any rate the loss from that cause had been very considerable. Another encouraging feature was with respect to the "Silver King" Mine—a recent purchase made about six weeks ago. From Aug. 6 till Sept. 19 there was raised from that mine 225 tons of ore, which gave a net profit of $4400, and from Sept. 19 to Oct. 10, according to a telegram recently received, they had raised 6000 tons, which, taken at the equal value of the ore previously raised, would give $12,000, or a total of $16,600. Now, the company paid for the mine $10,000, so that it might be said that in six weeks time the company had more than recouped the purchase money. The profits for the months of July and August were $11,000 and $12,000 respectively, but he was sorry to say that the profits for September were comparatively low; on that point the directors had received the following telegram from Mr. Godbe:—"The net profit for September is $2000, owing to the dead work in Flavilla and loss on smelting; have removed Evans and substituted Ballard; result satisfactory; particulars mailed; anticipate the profits for October will be the usual average." He had no doubt that this result was in a great measure due to the fact that Mr. Williams, the smelter, had left and gone away, and he was succeeded by Mr. Laity, who had also gone away. But they must not look to the result of any one month as a criterion of what they might do one way or the other. There were only one or two matters in the report which he need refer to, and one was with respect to the quotation of the shares on the Stock Exchange. After the last meeting the directors took steps to ascertain if it were possible to obtain a quotation, but they had it on good authority that owing to the shares being held largely in one or two hands, although it was possible they might obtain a quotation, yet it was also possible that they might be refused, in which case there would be no chance of afterwards obtaining it, therefore the directors had waited till within the last few days, when, believing they were in a better position to make the application, they had applied to the Stock Exchange for a quotation, and that application was now before the committee of the Stock Exchange, with every prospect of a quotation being granted. (Cheers.) The second matter to which he would refer was in connection with the Hidden Treasure; it was stated in the report that there was good reason to hope that an expensive and protracted lawsuit might be avoided, therefore it would not be advisable to give more information on that point than was contained in the report; a discussion on the subject could not do any good, and it might prejudice the company's case, and, therefore, they had better say nothing about it. The directors had given every attention and care to the business of the company, and the shareholders might rely upon their doing so in the future. He did not know that the directors had any shortcomings to answer for, but if so no doubt the shareholders would draw attention to them, and give the directors an opportunity of answering. In conclusion, the Chairman moved the adoption of the report and accounts, and called upon Mr. Hyndman, a newly elected director, to second it.

Mr. H. M. HYNDMAN, in seconding the resolution, said he felt himself at liberty to speak with a little more freedom than on ordinary occasions, because he had been so recently elected to the board that he could not take to himself any credit for the very satisfactory statement which was now in the hands of the shareholders. That satisfactory state of things was due to his colleagues who sat around him, and, moreover, as he now retired from the board, but offered himself for re-election, he was more in the position of a shareholder than a director, and his comments would be such as a director would not, perhaps, be justified in making. First, he would make a few observations upon the position the company held in Utah. Mr. Godbe, when he first came over here, was a little sanguine, in fact over sanguine, but from that time to this he had strenuously endeavoured to rehabilitate himself in the eyes of the shareholders, and had, therefore, spared no pains to get good mines. He need scarcely say how well Mr. Godbe had succeeded. Besides this the position of Mr. Godbe in Utah was very good, and he had heard from independent sources that the character of the Chicago Mining Company stood very high, and although it had been stated that a corporation had neither a body to be kicked nor a soul to be damned, yet he thought a high character was a good thing in a company as well as in an individual. Now, he thought that good character was due to Mr. Godbe. Perhaps this concerned the outside public more than the shareholders, but what did concern the shareholders, and was of great importance to them, was that throughout all the history of the company there had been no hocus pocus and no chicanery on the part of the superintendent. Everything had been open and above board, and if they compared the profits announced month by month and added them up, they would find they almost exactly corresponded with the total amount stated to be earned by the company. When in the month of January the company only earned the small and unsatisfactory sum of $5000, that fact was telegraphed to this country, and the directors made it public as promptly as when, in the month of May, they announced that they had earned $21,000, and the same open course had been pursued by the Chairman today in stating that they had only earned $2000 for September. The directors had also always stated the same plain truth with regard to the profits, or otherwise of the mines which they had purchased, and also with regard to the results of the smelting works; he contended that in thus stating the exact facts they were pursuing the only real sound course of mining, because in mining, as in other business, unless they knew what their actual position was they could not be satisfied, and if the same open course had been pursued with a good many other mining undertakings the position of affairs in the mining market would be a little more satisfactory than at present. (Cheers.) With regard to smelting, that seemed to be one of the most important parts of the operations of this company. During the past year they had smelted 12,000 tons of ore in round numbers, 3500 tons of which the company bought, and 8500 tons of which they took from their own mine. That gave an average of about 1000 tons per month, or 30 tons per day, and the capacity of each furnace being about 30 tons per day that would be equal to keeping one furnace running all the year round, and he was told that if they had been able to command as much ore as they desired they could have smelted 1300 tons or even 1500 tons, instead of 1000 tons. That was a state of things which seemed to him to be satisfactory; in the future he hoped they would be able to reach that amount, and possibly to do even more, as the Chairman had said Mr. Godbe had estimated the loss from competition at 10,000*l.*, and although that was a very large sum there was every reason to suppose that they did not lose less than what would suffice to pay 5 per cent. upon the capital. The opposition had been of a serious character, and it was very improbable that the company would ever again have to meet such serious opposition, because Mr. Dowlen had had long experience in the service of the company, and therefore knew its weak points. Of course, it was very unsatisfactory to have ruined those gentlemen, but it must be remembered that they competed with the company, and not the company with them. Those gentlemen entered upon the company's ground, and endeavoured to earn a considerable income in the district, but the company had now succeeded in obtaining a monopoly, and that could scarcely be considered to its disadvantage. It was probable that in the course of affairs the company might be able to put up profitably a third furnace, in which case they would be able to keep two furnaces running, capable of smelting 2000 tons a year. That was a possibility. He considered that the system of purchasing mines adopted by the company—paying a portion of the cash down, and the remainder to be contingent on the success of the mine—was one which worked fairly, both for the vendor and the company. (Hear, hear.) As regarded the appropriation of the profits, this brought him to a point on which he was sorry to say there had been some difference of opinion amongst some shareholders. The idea amongst some shareholders was that they should divide pretty closely almost all the profits which were made, but he thought the gentlemen present would agree with him that in connection with a mine as with everything else, the possession of a reserve fund was of the utmost importance. It was the reserve fund which saved the St. John del Rey, and not only was it of service if the mine fell in, or there was a fire, but under ordinary circumstances if they had a good reserve fund they were able to take a much better position; therefore, he advocated the payment of moderate dividends, and the formation of a good reserve fund—that was a policy he should strenuously support. With regard to the future, although it would be absurd to suppose they could always look to such good results as in the past year, still he believed that with the continued exercise by the directors of care and caution in the future as in the past the shareholders would have to congratulate themselves upon the satisfactory condition of affairs. (Cheers.)

Mr. MUTTLEBURY asked whether the other people were still working the Hidden Treasure?—The CHAIRMAN: They are working it in their own mine, but not in the disputed ground.

Mr. MUTTLEBURY said he agreed very much with the remarks of Mr. Hyndman, except that he differed from the directors on one point, and he was sure that the directors would take that difference of opinion in good spirit, because he considered that every shareholder had a right to express an opinion without being thought in opposition. Therefore, in that friendly spirit, he would make one or two remarks. (Cheers.) There was no doubt of the fact that the directors, with the assistance of Mr. Godbe, had made a very good purchase in the Flavilla Mine, and no doubt the purchase of that mine had saved the company, he would not say from total ruin, but from being a poor company. That being the case he thought it would be ungracious and ungenerous if the directors by chance made a bad bargain, that the shareholders should take them to task for that, but the shareholders must take the good with the bad, and, if they believed that the policy of the directors (as he believed it to be) was sound, then, as he had said, they must take the good with the bad, and set one against the other. (Cheers.) With respect to the purchase of the Granger and the Jasper it was evident they had not been very successful purchases. On this point Mr. Godbe had been very frank and candid, because he showed exactly how they stood, and what the probabilities were. It was bought for $500 in cash, and a certain amount in paid-up shares. Now, he objected to the payment of shares for a property. He knew the directors had full power to do as they had done, according to the Articles of Association, but he, for his own part, certainly objected to any portion of the payment for these mines being made in paid up shares. If they bought a mine for $10,000 or $20,000 by all means let it be paid for in cash, but he did object to any portion of the payment being made in paid-up shares, because by doing that they were watering the property, and, moreover, although the denomination of the shares might be 10*l.*, no doubt the persons who took them in part payment had estimated them at the market price of the day, and had entered into their arrangements upon that basis. This was a point on which he felt strongly, and he hoped that in any future purchases which might be made the directors would under no circumstances make any part payment in cash.

The SECRETARY said that 125 shares had been forfeited, and therefore to that extent the capital had been diminished.

Mr. MUTTLEBURY said there was another subject to which he wished to refer. He was in favour of forming a reserve fund, but at the same time he did not think that 8 per cent. was quite sufficient dividend for a mine. He was opposed to a high dividend, such as 15 per cent., or any such large percentage, but he certainly thought they ought to receive 10 per cent. upon such an investment as this. This he considered a fair dividend, and any surplus beyond that could fairly be placed to reserve. He bore testimony to the zeal and ability with which Mr. Godbe had worked for the company; he was the right man in the right place, and he believed there could not be a better man.

A SHAREHOLDER said that, with respect to the general system of purchasing mines, the directors had been successful with the Flavilla, and that had encouraged them to make other purchases, but he thought there was some danger involved in this principle of leaving so much money in the hands of the directors or of Mr. Godbe for purchasing mines. He fully approved of the policy of the directors in building up a great reserve fund. He should be sorry to tie the hands of the directors in any way, but he thought that before a purchase of a mine was definitely decided upon the shareholders should be called together, and their opinion taken upon the subject.

Mr. CUTCLIFFE said that certain clients of his thought that a quarterly dividend of 6s. per share might fairly be distributed, and even then a fair amount would be left to be carried to reserve fund. He would not move an amendment, but would wait to hear the opinion of other shareholders.

Mr. TEBB agreed that the statement put before the shareholders might be considered fairly satisfactory, and augured well for further success in the future. There was only one drawback—with respect to the smelting works, which showed a deficiency as compared with previous working, but he had understood from those who were familiar with that class of the operations that if this branch of the undertaking were properly and persistently followed up by a good manager they would be able to pay a good dividend upon the capital from the smelting works alone. There was not the least doubt that the smelting works were of a much sounder and more permanent character than mining operations generally, and therefore he hoped the directors would develope that branch of business, and thus ensure a more permanent dividend, and make up for any deficiency which might occur owing to the fluctuation of mining property generally. With regard to the mode of paying for any mines which were purchased, the observations of Mr. Montgomery commended themselves to his mind. He objected to the shares being diluted, except with the consent of the shareholders. But he put it upon other grounds. He thought they could do better in Utah by paying cash; they could make better bargains. They knew that money was very valuable in Utah, the ordinary rate being from 1½ to 2 and 2½ per cent. per month, and, therefore, it stood to reason that by paying money down the company could make better bargains than by paying partly in shares. He congratulated the directors upon the successful purchase of the Flavilla and Silver King Mines. A mine like the latter which paid its purchase money in two months was not an ordinary mine. He thought the observations regarding the efficiency of Mr. Godbe were well merited; the shareholders were deeply indebted to that gentleman, and he also thought the shareholders ought to show their appreciation of the services of Mr. Davis, who had done so much to develope the Flavilla. There was no doubt the directors had had great difficulties to contend with, and, taking all matters into consideration, he thought the report was exceedingly encouraging, and he hoped they might look forward to the shares being at a premium at no very remote period.

Mr. MONTGOMERIE agreed in the appreciation of the services of the manager. He agreed that in some cases it might be desirable for the directors to take the shareholders into their confidence, when considering the desirability of purchasing new mines. He also thought the results of the different purchases should be shown in some clearer form, so that the shareholders might see the exact result of the working of the different mines. He thought with Mr. Muttlebury that the shareholders ought to expect 10 per cent., and he should certainly be satisfied with 10 per cent. dividend; it was also desirable that the company should have a good reserve fund, because there was no doubt a good reserve fund tended to give stability.

Mr. MORRIS thought they should pay 6s. per share. He said he held proxies in favour of such a course, but should not use them.

A discussion ensued, in the course of which it was pointed out that many persons from death or necessity wished to sell their shares, and there were now no means of doing so except in what was called a "dark" market.

Mr. MORRIS thought the dividend should be 12 per cent. before they put anything more substantial to the reserve fund.

The CHAIRMAN replied: He said it was not the intention of the board to pay in shares for any of their purchases if they could pay in cash; last year they had not had the cash to do it, and, therefore, paid in shares to some extent. The directors would raise the dividend as fast as they possibly could. As to calling a meeting before the purchase of every property it was sometimes impossible owing to the shortness of time.—The resolution for the adoption of the report and accounts was then put and carried.

On the motion of the CHAIRMAN, seconded by Mr. MONTGOMERIE, Mr. Hyndman was re-elected a director.—On the motion of Mr. MUTTLEBURY, seconded by Mr. WALKER, the auditor, Mr. Thos. Meggy, was re-elected.

Votes of thanks were passed to the Chairman and Mr. Godbe, and the meeting broke up.

GLENROY LEAD MINING COMPANY.

An extraordinary general meeting of shareholders was held at the offices of the company, Austinfriars, on Thursday,

Mr. S. W. DAUKES in the chair.

The notice convening the meeting having been read, the following special resolutions, which had been passed at a meeting held on the 10th inst., were passed:—

"That the capital of the company be increased from 8000*l.* to 56,000*l.* by the issue of 12,000 new shares of 4*l.* each."

"That 9000 of such new shares be allotted as fully paid up, in the proportion of three shares for each of the other 3000 shares, to be given as a bonus to the allottees of the said 3000 shares, such new shares to be offered, in the first instance, to the present shareholders, *pro rata;* and that the directors have full power to make such calls and at such times as they may consider necessary upon the 3000 new shares, and generally to do what they may deem necessary to give full effect to the above special resolution, provided that no one call on such new shares exceed 10s."

A very favourable report from Capt. Rowe, which appears in another column, was read; and the meeting terminated with the usual vote of thanks to the Chairman.

WHEAL BASSET MINING COMPANY.

A three-monthly meeting of adventurers was held at the mine on Tuesday, Mr. R. R. BROAD, of Falmouth, presided, and read the accounts, which showed that the balance now against the mine was 6483*l.* 2s. 4d.

The CHAIRMAN stated that the four calls made up to this time had amounted to 3584*l.*, and it was very satisfactory indeed to know that this large sum there at present remained due on the two last calls only 263*l.* and even some of this had been paid that morning. This showed not only that the adventurers took great interest in the mine, but also that they had a strong belief in its future prosperity. He had such confidence in this himself that he had increased his interest in the concern; other old adventurers had done the same, and he hoped still further to increase the number of his shares. It would be seen, therefore, that there was no lack of encouragement to carry on the adventure, and although the price both of tin and copper was low, he looked forward to a great success for the mine.

A call of 2*l.* per share was unanimously made, and a hope having been expressed that in future the calls would not be so heavy, it was pointed out by Mr. J. HOCKING, jun., that it was only on condition of the adventurers making every effort to reduce the debt that Mr. Basset consented to such a liberal reduction of the dues. Seeing that their loss in the last quarter had been somewhat heavy they could not, in his opinion, make a call of less than 2*l.*

Mr. MARTYN, the purser, added that the large adventurers, upon whom the burden would principally fall, were entirely in favour of a call of 2*l.*, and the shareholders might depend upon it that it was the proper course to pursue. (Hear, hear.) In the long run, when the mine was brought into a paying state, the shareholders would have reason to congratulate themselves that they reduced the debt by this means instead of waiting to do so out of their profits. If they had any luck at all upon their new lode it ought to do something towards helping them out of their difficulties, to say nothing of what they might expect from the old mine proper.

Capt. TREVENA said he was almost sure that the new lode would do something for them yet, for although it was not rich it was profitable at every point.

Capt. TREVENA in his report, after enumerating the various points in the mine, stated that in the tribute departments they had pitches working on copper from 6s. 8d. to 15s. in 1*l.*, and on tin from 10s. to 13s. 4d. in 1*l.* He was pleased to state that since the last meeting they had intersected the new lode both in the 65 and 75 cross cuts, and although not rich at the intersections it had the appearance of opening up a profitable copper lode; and guided by these appearances they looked forward with much interest to the cutting of this lode in the 60 cross-cut. This cross-cut is over 100 fms. east of the most easterly point yet seen of this lode, and more nearly parallel to the rich lode in North Basset Mine. Though the loss on the last 12 weeks' working seems heavy, the managing agent explained that 300*l.* of this had been incurred by laying down the new flat rods between Richards' engine and Carnkie shafts.

Captain TREVENA added that, although their present position was not cheering, he thought they had occasion to be proud of their future prospects with regard to the new lode in the 65 so far as it had been opened out. They had only opened on the level about 7 fms., and 5 fms. of that drivage would average 1l. per fathom. In Wheal Basset that was equal to a lode worth 30*l.* a fathom for tin, for they could do better with copper at 11*l.* than they could with tin at 30*l.* They had also cut this lode in the 75, and where intersected, although not rich, it had proved a productive lode, and by opening their levels on that lode he believed they would eventually be able to increase their copper samplings considerably. (Hear, hear.)

They now required to force on the 75 end west as fast as possible to communicate with the 65 end driving east of Sampson's; and when that was done it would go a great way towards meeting their costs, if not entirely so. (Hear, hear.) In their tin department it was not to be expected that much good could be done at present prices, and the fact was that if they raised more tin than they were now doing they would lose more by it. He had a strong belief that they would soon see a better price.

DOLCOATH MINING COMPANY.

The three-monthly meeting of adventurers was held, on Monday, the attendance being large.—Sir F. M. Williams, Bart., M.P., presided. The accounts showed that in the three months 6489*l.* had been paid for tutwork and surface labour, and 1124*l.* for tribute. The merchants' bills were 2789*l.*, and other items brought up the expenditure to 10,734*l.* On the credit side 297 tons odd were sold for 12,838*l.*, and 60*l.* had been received for copper ores and 68*l.* for arsenic. This left a profit, after paying 648*l.* and dues to Mr. G. L. Basset of 1595*l.*, which with the balance from the last meeting of 121*l.* gave 1717*l.* available for dividend. It was proposed to pay a dividend of 7s. 6d. per 4296th share, which would leave a balance of 106*l.* in hand.

The Chairman regarded the report as very satisfactory, and he was also happy in being able to announce that the boring machine which they had been experimenting upon for the last few months had turned out a perfect success, and that he had every hope that the mine would derive very considerable benefit in consequence.

Capt. Josiah Thomas said they would remember that when he first saw the Barrow borer with Mr. Loam he was much taken up with it, but there were several difficulties in the way. Now he was glad te say that at last they were working it most successfully, far beyond their expectation. In fact, they were driving in the 314 three timee as fast, at least, as they could by hand labour. In the 302 the very best pare of men in the mine had, during 12 months, driven 9 ft. 10 in. per month, and in ground of equal hardness the boring machine had, last month, driven 5 fms. 4 ft. 7 in., which was three-and-half times as fast. (Applause.) In the 326 east and west the ends were being driven by hand labour—nine men in each, and some of the best they could find—scarcely 8 ft. per month, whilst the boring machine would drive 4 or 5 fms. Never had he seen so much prejudice raised in reference to the boring machine. Often had he heard it said that the Cornish were prejudiced against new inventions in machinery, and he had denied it, but he should never think of doing so again after his experience of the boring machine. The most trivial excuses had been made, nothing had been said in its favour, but everything that could be suggested against the machine had been suggested. He was, therefore, very proud to think that Dolcoath had been the first mine to prove that the boring machine was a success. (Applause.) It was no longer a matter of opinion or theory, but an accomplished fact, that a boring machine could in hard rock in the deepest mine in Cornwall drive three times as fast as hand labour; and if three or four machines were worked he believed the cost would be but very little more, and probablyit might be even less than by hand. (Hear, hear.) Of course, if some liked to cross the Atlantic in an old sailing ship they could, but he preferred the fastest Cunard steamer for the purpose. (Hear, hear.) For in mining, as in everything else, it was true that time was money, and the faster they could open, all the fixed charges being the same, the more successful the work would be. (Hear, hear.) He was very sorry the price of tin had not gone up. Three yeare ago if anyone had ventured to predict that tin would fall to little over 40*l.* per ton he would not have been believed, and if anyone had been bold enough to say that, with that price, so deep a mine as Dolcoath would be able to make a profit his predictions would have been received with great incredulity. They had no control over the price of tin, but it was gratifying to know that the mine was looking very well indeed. They had every reason to congratulate themselves that they had so good a mine. They had been expecting a great improvement in the western part, and that was taking place. The 248, west of Harriett's, was now worth 40*l.* per fathom, which was important, as that was a comparatively shallow part of the mine. They had 90 fms. below, and even if the bottom ground gave out there was plenty of tin to explore for many a long year to come. But he was very glad to say there was no failure in the bottom of the mine, for on Friday last he saw as fine tinstuff there as he ever saw. The lode was 22 ft. wide, and showed no sign whatever of exhaustion or decay. He trusted before long the price of tin would improve, and then they would do better. (Loud applause.)

In reply to Mr. Rule, Capt. Thomas said at present it was not possible to apply the borer to the stopes. There was no difficulty in the machine itself, the difficulty was with the stand, but a tripod properly weighed might be found to do so. There could be no doubt it would be a great advantage, for the machine would bore 20 holes whilst eight men were boring two.—Mr. Rule said the stopes with the machine could be driven for 3s. a ton, instead of 7s. by hand as now.

Mr. Loam suggested that Capt. Thomas's remarks on the boring machine should be incorporated in the report, that distant shareholders might know what was being done.

In answer to Capt. Pascoe, Capt. Thomas said that all but three of the men working the machine were connected with the mine, and those three men were Cornishmen, who had been to Lancashire.

Replying to Mr. Carter, Capt Thomas said about 10 or 12 tons of tinstuff had been stamped during the quarter. The rough and slime that escaped from the mine were worth about 3 lb. a ton.

Mr. Wheab thought the shareholders should have an opportunity of thanking Capt. Thomas and Mr. Loam for their energy and perseverance in connection with the boring machine, and therefore he moved—"Considering the great success met with in the use of the boring machine in this mine after a long, protracted, and at first uncertain trial, our thanks are specially due to our manager, Captain Josiah Thomas, and our engineer, Mr. Loam, who from the first have been unwavering in their opinion of ultimate success in adapting the machine to their requirements." They could not thank too highly those gentlemen for their untiring energy and perseverance in this matter,—Mr. Carter seconded the motion, which met with the hearty support of the Chairman, and was carried unanimously.—Capt. Josiah Thomas acknowledged the vote, mentioning that Mr. Loam was the first to call his attention to the borer.

Mr. Loam accepted their thanks with very great pleasure. In his extensive travels he had always felt it his duty, as well as his pleasure, to look out for whatever was for the benefit of mining interests. For very many years he had recognised the advantage it would be to be able to open up mines quicker, feeling certain that it was only by being able to deal with more facility with their hard rocks in deep mines that they could compete with the shallower and richer mines abroad. Directly he saw the Barrow drill he was struck with its simplicity, for his experience as an engineer had taught him that simplicity and efficiency went hand in hand. As the result of his recommendation the borer was brought to Dolcoath, and he was proud of the result, though he never expected to have to meet the objection that mines could be worked too fast. It reminded him of the objection some raised to railways superseding stage coaches. Yet trade had benefited, and he felt sure that the power to open up mines three times as fast would end in the same beneficial results. At present the mine burnt 800 tons of coal a month, and since, whether they were driving one fathom or three, the fixed charges were the same, it was obvious that it must be a great advantage to open a mine faster. He hoped to see the use of the boring machine extended not only in this mine but in others; and he was glad that its first success was identified with this grand old historical mine. Not the least among its advantages was the large quantity of cool air the use of the compressed air for the machine took into the ends, reducing the heat in some cases from 10 to 15°. This was a great thing for the health of the miner, and he had several plans in his mind for using compressed air in other parts of mines.

Capt. Thomas, in reply to Mr. Rule, said he used dynamite entirely where the borer worked, and it on the whole was, in his opinion, the best. The only thing against it was the smell, which in close ends was very bad.

The Chairman, acknowledging a vote of thanks, hoped that when next they met tin would be higher and their dividend better.

Subsequently speeches were made on the several good points in the mine.—Capt. Charles Thomas, of Cook's Kitchen, believed the borer would be a great thing for Corowall. Three fathoms were quite as much as he expected any borer to do, and now 6 fms. had been accomplished. Although Cornishmen might be prejudiced they were ready to appreciate success and profit by it. The introduction of machinery had never been known to injure manual labour.—Capt. Josiah Thomas, of West Seton, believed the boring machine was going to be the salvation of Cornish mining in years to come.

An animated discussion arose about the comparative merits of explosives, especially dynamite and tonite, and it resulted in Capt. Josiah Thomas, of Dolcoath, agreeing to use dynamite for one month and tonite for another, in as close an end as he could find, the condition being that the explosive which showed the least results should be supplied for nothing. Mr. Cunnack, of Helston, gave the challenge as the champion of tonite, and it was at once accepted by Capt. Thomas, agent of the British Dynamite Company.—*Western Daily Mercury.*

SCOTTISH AUSTRALIAN MINING COMPANY.

The half-yearly meeting of shareholders will be held at the City Terminus Hotel, Cannon-street, on Friday, when the directors will submit their report and accounts embracing the operations of the company for the six months ending on June 30:—

Lambton Colliery.—The company's sales of coal amounted to 85,485 tons for the half-year, and the net profit realised from the colliery during that period to 15,815*l.* 13s. 3d. The colliery and its appliances are reported to be in good condition, and proper action is being carefully directed to the maintenance of its production and to continued economy in working.

The Cadia Properties.—During the last two months of the half-year now dealt with, and up to the date of the latest advices received from Capt. Josiah Holman (the end of July), arrangements for the systematic working of the copper and gold-bearing lodes that have been partially laid open in these properties had been pushed on. The former copper workings were being cleared out, and 14 tributers were already engaged at some of them, while the smelting works erected at East Cadia were about to be put into serviceable condition for converting the ores to be obtained from these mines into copper. As respects gold mining, Capt. Holman reports that he was putting two men to open out Trathen's reef at a promising point in order to get some stone to hand by the time the stamper plant would be ready for testing it, and that a similar force will be put to open Holman's reef for the same object. On July 15, 35 miners (including tributers) had commenced work on these properties, and the directors expect, therefore, that the communications relating thereto will soon assume increased importance.

Copper Property in Queensland.—The latest advices from this establishment, extending to July 19, report one smelting furnace as on the point of being completed and the construction of another well advanced. Mining operations continue to be mainly devoted to opening out the property, but the mining captain reports that ore was at grass and in sight sufficient to give employment to the two furnaces for a considerable time. The quantity of ore at that date which had been sampled was 377¼ tons, and there were 142 tons more raised, but not then sampled; total at grass, 519¼ tons.

Accounts—Dividend.—The balance of profit shown by the general revenue account (including 3742*l.* 12s. 1d. brought forward from the previous account) is 18,328*l.* 16s. 6d. The directors propose the payment of a dividend at the rate of 17½ per cent. per annum on the paid-up capital of the company, 140,000*l.*, free of income tax, which will require 12,250*l.*; to add to the reserve fund the balance standing at the credit of new shares premium account, 2273*l.* 3s. 3d., and in addition thereto, out of the above balance of profit (making together 3000*l.*, and bringing the reserve up to 10,000*l.*), the sum of 726*l.* 16s. 9d.; and to carry forward to next account, 5309*l.* 19s. 11d.=18,286*l.* 16s. 8d.

The manager, in his latest communication, writes with reference to the profit earned during the past half-year:—This, as heretofore, with the exception of a very trifling item, is derived entirely from the colliery. It is, however, satisfactory to find two other mining undertakings now under way with the promise of ere long becoming sources of profit to the company, whose prosperity will then rest on an extended basis."

GUNNISLAKE (CLITTERS').—A four-monthly meeting of adventurers was held on Monday, Mr. W. Matthews in the chair. The accounts showed a balance in hand from last meeting of 1155*l.*; sales of copper ore, 3089*l.*; discounts from merchants, 13*l.* The costs, &c., for the four months amount to 2599*l.*, leaving a profit of 504*l.* on the four months, and a balance in hand of 1659*l.* A dividend of 1s. per share was declared, and the shareholders informed that the sales of copper ore had been 33 tons more than in the previons four months, and the produce ¼ per cent. higher, but that in consequence of the great drop in the market price, the profit realised had been less by about 550*l.* than they otherwise would have been.

LEVANT MINE.—At a meeting of adventurers, held on Oct. 17, the accounts showed a debit balance of 999*l.* 4s. 10d. The bankers' pass book, showing a balance of 1121*l.* 2s. 11d. against the mine, was laid on the table and allowed. Messrs. Henry Trezise and James Thomas say—We have 48 pitches working by 106 men and 8 boys, tributes varying from 3s. 6d. to 18s. in 1*l.*, and 55 men and 22 boys on tutwork—total, 161 men and 30 boys. We have raised during the last four months about 76 tons of tin and 950*l.* worth of copper. We calculate to raise tin and copper enough during the next four months to meet the costs of the mine.

WHEAL JANE.—The adventurers held an adjourned meeting on Monday, when an amended statement of accounts was produced by Mr. John Hocking, jun., the new purser, and a report read from Capt. Southey, the newly-appointed manager, which differed very widely from that recently sent out to the shareholders from Capt. Giles. Capt. Southey is not of opinion, as were his predecessors, that the mine is in such a deplorable state as to be beyond recovery; on the contrary, he holds out a confident hope that even with tin at its present price it can pay costs.

COTTON POWDER COMPANY.—At a meeting of shareholders, on Friday, special resolutions were passed for raising additional capital by the issue of preference shares for the purpose of carrying on the company's business and extending its works. A confirmatory meeting will be held in the course of a month.

"I NEVER TOUCH MINING."

In a certain corner of pleasant Yorkshire a well-known inn—which, according to the inscription over its quaint doorway, must have been standing a lifetime when the roystering "Dooke Viluas" passed away a few doors higher, with "floors of plaster," &c.—offers in its dusky ancient rooms a soothing retreat to men in search of change and rest. A pleasant stream of water, with most refreshing cadence, gurgles down the open street, but the townspeople, disregarding this, have recourse to pumps, for all the world like one of Kent's knife cleaners, and supply themselves from a lower depth. Strange, in this out-of-the-way place, that on first entering our ears should be jarred with Stock Exchange babble—the "rise of Caleys and the fall in Turks." Standing well in the inglenook, and with his broad shoulders effectually screening the fire from his listeners, a village statesman was going over his speculative woes, beginning with Venezuela, and finishing with Peru. Ever and again he repeated—"But I never touched mining." Then one of the circle, with a Mephistopheles cast, would turn round with mocking "asides," producing an effect similar to the famous Black heath scene between Cade and Dick the butcher. Why he should do so came out later on, when the oracle, finding noon approaching, went for his customary libation to the Rodney, little dreaming how well it was known that he held a certificate for 100 shares in the Hecla Lead Mining Company (Limited), capital 30,000*l.*, in shares of 1*l.*, fully paid, without any further liability whatever; and that Prawn, the local banker, had chucked it back contemptuously over the counter when asked to make a small advance on this valuable security. How he got it arose thus:—From offices in Queen Victoria street, commanding a surprising bird's-eye view of St. Paul's, issued a pamphlet for "private circulation only," proving to the most sceptical that the Hecla, though in Cardigan, was on the Van lode, that the shares must have an enormous rise, and that only the dullness of the mining market could justify the sale of 100, or part, at so low a price as 2*l.*, "feeling, as we do, that they are doomed to see 5*l.* before Xmas." From a cellar in Walbrook—a burrow of investment—the intelligence flashed two days afterwards that, owing to the excitement throughout Wales, brought about by several of the miners coming to surface with waistcoat pockets crammed with ore, the giving away of shares at 2*l.* must positively cease, adding—"we are buyers of 500 shares at 3*l.*"—*Vide* report.

Report.—"I am most pleased and deeply thankful to inform you that our pay and setting day passed off well. Last night the men took out several pigs of lead from the grandest soil I ever saw. I congratulate you on the prospects."

Now, to the unbiassed mind these two distinct and independent emanations could convey but one impression, that it only needed to purchase 100 Hecla shares in Victoria-street at 2*l.*, to sell them at 3*l.* in Walbrook, and the two operations would be so instantaneous that it might almost still be said, "I never touch mining." The shares were bought and duly offered, with this deep remark—"I should not sell, feeling certain they will go much higher, only"—alas! alas! the Trogoldyte of Walbrook was still yearning to buy, but only 500 shares "in a line" would satisfy him:—

"If you were to offer me," he writes, "499 shares I could not induce my client to take them. Should you have any friend holding the requisite number, I shall be glad to hear from you."

Resenting the being fixed with a hundred shares, the holder threatened to advertise them at a ridiculously low price, to scatter them broadcast on 'Change, and to write to the secretary. No answer. He, therefore, carried out the last of his threats, and in a fortnight received this reply:—

"I have to acknowledge the receipt of your favour respecting the sale of shares of this company, and in reply, am instructed by my directors to call your attention to paragraph 97 of the Articles of Association, and to remain your obedient servant to command. Paragraph 97. No part of the company's funds shall be diverted to the purchase of its shares."

The result is he still holds a 100 Heclas.—From the *Stock Exchange Observer.*

Esquimaux Mica.—The New York Times reports that the Era schooner put into New London, Connecticut, on Oct. 11, on her return from Cumberland Inlet, where she had been sent by some Philadelphian merchants in search of mica and graphite. On reaching a point known to whalemen as Nialtic Valley, the crew were put to work laying a tramway, building shanties, and mining. The miners worked in two gangs in different quarries, about 1300 ft. above the level of the sea. The tramway did not reach all the way up, and the mica was transported much of the distance on the backs of the workmen. The mica was found in veins some 10 ft below the surface of the ground, and was principally blasted out. Some of the blocks are remarkably large and clear, the sheets measuring 18 in. by 20 in., and some blocks weighing 50 lbs. Altogether about 15 tons were excavated, which exhausted three veins. Six weeks were spent prosecuting this work, and three days in further prospecting, after which the Era sailed on her voyage home. The Era's crew were assisted in their labours by a gang of Esquimeaux, who stayed with them a short time, but so n left to begin their summer's deer hunting. The mica obtained is estimated to be worth from $5 to $12 per pound. Nothing can be ascertained about the graphite procured."—[Lieut. Mintzer went out in the Tigress some time since, when she was sent in search of the Polaris, and then observed signs of deposits of mica and graphite along the shores of Cumberland inlet; and it is stated that on his return he interested some capitalists in Philadelphia in the matter.]

Chemicals, Minerals, and Metals.—(Messrs. J. Berger Spence and Co., Oct. 25)—Alumina: Alum, 6*l.* 15s. for loose lump; ground, 7*l.* 15s.—Aluminous cake, 4*l.* 15s.—Ammonia: Sulphate, grey, 18*l.* 15s.; best London white, 20*l.* 8s.; muriate, 30*l.*; sal ammoniac, firsts, 45s.; seconds, 44s.—Acid: Tartaric, English, at 1s. 4½d., to 1s. 5d., ground or crystal; foreign, 1s. 4¼d., crystals; oxalic, 5½d.; sulphuric, 3*l.* 10s. to 3*l.* 15s.; picric acid, 1s. 8d. per lb.—Arsenic: 9*l.* 10s.—Bleaching Powder: 7*l.*; for the whole of 1877, 6*l.* 15s. to 7*l.* 5s.—Litharge: Best flake, 24*l.*—Metallic Salts: Iron salts, green and rusty copperas, 55s.; in casks or barrels, 60s.—Copper Salts: Sulphate of copper, 23*l.* 10s.—Magnesia: Epsom salts, 3*l.* 17s. 6d.; refined, 4*l.* 10s.—Nitrate of Soda: 12s. 3d. to 12s. 6d.—Potash: Muriates, 80 p. c., at 6*l.* 2s. 6d. f.o.b.; Prussiate, yellow, 11½d.; chlorate, 10½d.; bichrome, 5½d.—Soda: Cream caustic, 60 per cent., 12*l.* 15s.; white, 60 per cent., 13*l.* 10s.; soda ash, 1⅞d.; soda crystals, 4*l.* 10s.; bi-carbonate, 10*l.* 15s.; salt cake, 2*l.* 17s. 6d.; Glauber salts, 2*l.* 17s. 6d.—Sugar of Lead: Brown, 25*l.*; white, 37*l.* 10s.; grey, 31*l.*—Brimstone: Best thirds, 6*l.* 5s. to 8*l.* 10s.—China-clay: 15s. f.o.b Cornwall; "Rosemellyn," 24s.; "BM," 34s.—Iron Ore: Hematite, 15s. to 22s. 6d.; oolitic, 8s. to 10s.; Algerian, 50 per cent., 23s. to 24s., c.f.i. U.K.—Manganese: Ores, 90s. for 70 per cent.—Pyrites: Spanish cupreous, 5½d.; non-cupreous, 6¼d.—Phosphate of Alumina, 3*l.* to 3*l.* 10s. per ton.—Phosphates: High strength, 80 to 85 p. c., 1s. 4d. to 1s. 5d. per unit; Estremadura, 1s. 3d.; ordinary, 60 per cent., 1s.; precipitated phosphate of lime, 70 per cent., 8*l.* 15s.—Iron: "Ayresome" Middlesborough Pig-iron: No. 1, 50s.; No. 3, 46s. 6d.; No. 4 (foundry), 45s.; No. 4 (forge), 43s.—Hematite, No. 1, 70s.; No. 2, 67s. 6d.; No. 3, 65s.; No. 4, 62s. 6d.; No. 5 (mottled and white), 62s. 6d.—Bessemer, No. 1, 70s.; No. 2, 67s. 6d.; No. 3, 65s., less 2½ per cent., or four months' bill, net.—Scotch warrants, 56s. 6d.; Scotch g.m.b., No. 1, 58s.; No. 3, 56s. net.—Copper: Chili bars, 74*l.* 10s.; B.S. ingot, 82*l.*; tough cake, 81*l.*—Lead: Best English soft pig, 21*l.* 15s., delivered in Manchester.—Spelter: Silesian, 23*l.* 15s.; English, "Swansea Vale," 23*l.* 5s.—Tin: Straits, 73*l.*; Australian, 72*l.*; Billiton, 72*l.*; British, 77*l.*—Tubes and Fittings: Discounts on application.

AUSTRALIAN MINES.

BURRA BURRA.—Capt. Sanders, Sept. 2: I beg to state that during last month Morphett's engine-shaft has been sunk 7 ft. 8 in., now down to the depth for an 85 fm. level; have 5 ft. more to sink for fork, and frame set for bottom of plat. We hope to see the whole of this completed by end of present month. The 70 north has been extended about 4 fms. 3 ft. Have passed through a large cross-course, letting out large feeders of water on east side, and have shifted the lode to the west about 6 ft. Beyond the cross-course the ground is comparatively dry, the lode close and in a disordered state; but I think this is only temporary while in the influence of the cross-course. Have cut a winze plat at the 60 near Waterhouse's, and sunk the winze about 2 fms. below that level towards the 70 end. In the 60 cross-cut, driving west towards Peacock's air-shaft, the ground is still hard, but are making fair progress considering the distance from ventilation. We have six men busily engaged clearing the 60 fm. level from this place to Roleh's, so as to ventilate this part of the mine, but having from 700 to 800 gallons of water per minute running through the level, out of which the men have to fish all the stuff, the progress is more slow than we could wish. At the 50, at Peacock's air-shaft, we have cut a plat, put in penthouse, and sunk about 6 ft. towards the 60. Ayer's old shaft has been thoroughly secured from the 50 to the surface, whim erected, and are in regular course of hauling from different levels. At this shaft we have let four pitches to 16 men at 10s., and one pitch to three men at 11s., in 1*l.* Other parts of the mine just as usual. The open and surface works are being pushed on as fast as possible, and progress satisfactory.

ENGLISH AND AUSTRALIAN (Copper).—Port Adelaide, Sept. 7: The stock of coal at Port Adelaide was 2940 tons. The smelting operations, both at Port Adelaide and Newcastle, were proceeding satisfactorily. Since the date of last advices 65 tons of copper had been shipped.

PORT PHILLIP AND COLONIAL (Gold).—The directors have received the following advices, dated Sept. 4. The quantity of quartz crushed for the four weeks ending Aug. 16, 2815 tons; pyrites treated, 16 tons; total gold obtained, 635 ozs. 7 dwts., or an average per ton of 11 dwts. 12 grs.; receipt, 2924*l.* 5s. 2d.; payments, 2219*l.* 3s. 5d.; profit, 705*l.* 1s. 9d., which added to last month's balance of 1131*l.* 18s. 7d., made an available balance of 1137*l.* 1s. 11d., which was carried forward to next month's account.

—Telegram, dated Melbourne, Oct. 21: Month ending Oct. 11—Yield per ton, 4 dwts. 21 grs.; profit, 954*l.* Will remit 1200*l.*

SCOTTISH AUSTRALIAN.—The directors have advices from Sydney, dated Sept. 1, with reports from the Lambton Colliery to Aug. 30. The sales of coal during the month of August amounted up to the 30th of that month to 16,199 tons.

YORKE PENINSULA.—The directors have advices from the committee of inspection at Adelaide, dated Sept. 6, with reports from the Kurilla Mine to the 4th. Capt. Anthony reports:—Kurilla Lode: At the 45, east of Hall's shaft, the lode has been poor the greater part of the past month, and although there is some rich ore in it, it is not sufficient to pay. This drive is now 27 fms. from the shaft, and is being driven at the rate of 5 fms. per month. At the 35 east I drove 10¼ ft. on the side bunch of ore, carrying good ore, but at that point it split into small branches. In the back and bottom of the drive the ore still stands good, but especially in the bottom, where it covers an area of about 50 ft. of solid ore. I have resumed driving the 35 east, which was temporarily suspended to test the last-mentioned place. The lode here is pinched, but I see no reason why it may not soon open out again, and make ore as formerly. On the 22nd ultimo. I began to sink a winze below the 35 to ventilate the 45; it is down 2 fms. The lode here contains some good stones of ore. I continue to sink the winze from the 25, and expect to hole to the tribute pitch in a few days time. The rise from the 35 is holed to the 25, and the men are put to stope the back of the 35; six men at 6*l.* 10s. per fathom. The yield of ore will be 5 tons of 18 per cent. to 20 per cent. ore per fathom, or 7s. 10d. in 1*l.* Further, six men are working on tribute at 8s. in 1*l.*—Morphett's Lode: The enginne-shaft is now 6 fathoms below the 10. The lode is gradnally and satisfactorily improving, varying in size from 1 to 2 ft., of good yellow ore, equal to 3 tons of 18 per cent. ore per fathom. Six men are working on tribute in the 10, at an average of 9s. in 1*l.*—Ore Returns: Since my last, dated Aug. 7, I have sent away for shipment per Invercauld, in addition to the former lots (say) 39 tons of 22 per cent. ore and 20 tons of 12 per cent. ore, estimated to be worth 56*l.* net. There are on the mine about 180 tons of (say) 16 per cent.; estimated value, 1000*l.* net. On the whole, our prospects are very encouraging, and even now a somewhat higher price for copper would place a fair balance on the right side.

AUSTRALIAN CENTRAL (Gold).—Capt. Anguin, Sept. 3: During the last four weeks we have extended main drive (top level) a short distance, but want of air compelled us to stop its extension until No. 3 "jump-up" is completed. A cross-cut has been driven a distance of 100 ft. (principally through black clay) from the main upper level, and a fine stope of wash dirt has been struck, which is dipping gradually north; it is now under the bottom of the level, and will not be able to be worked until No. 3 "jump-up" is finished. There is now (from want of air) only six men breaking wash dirt. I have also six men putting in bottom level. During the last fortnight the bottom level has been extended 65 ft. along the course of the first quartz reef, as shown in the plan recently forwarded to England, I have not seen gold in the stone up to the present time, but I have found fine gold in the casing. The reef is heavily charged with mundic, and from appearances there is every chance of payable gold being struck in it if followed up.

Fire-Damp.—At the Academy of Sciences, M. Coquillion dwelt on the limits within which the explosion of fire-damp is possible. The difficulty of determining them lies in this, that small quantities, such as it is safe to operate upon in laboratory, will give but very slight detonations. Under such unfavourable circumstances, M. Coquillion has, nevertheless, ascertained that with seven, eight, or nine parts of air, and one of protocarburet of hydrogen (fire-damp), no explosion whatever takes place when a red-hot iron, or a spiral of platinum at white-heat, is introduced; the mixture will catch fire with a lighted match, but without any perceptible detonation. With one part of fire-damp and five of air the electric spark will cause no explosion; but with six there will be several slight ones by fits and starts. In short, within the limits of six and 16 parts of air with one of fire-damp there seems to be no danger. Palladium at a red-heat may be brought into contact with the most explosive mixtures known without producing any effect except that of diminishing the bulk of the gas.

Directory of Manufacturers.—The fifth edition of the "Illustrated Guide, Directory of Manufacturers, and Register of Trade Marks of Great Britain and Ireland" has just been published (London: Hodder and Stoughton, Paternoster-row), and contains a vast amount of information in the shape of names and addresses of manufacturers of almost every conceivable material and commercial product. The special features claimed for the volume are that its information being printed in English, French, and German it is available for use abroad as well as at home. It contains a list of the trades carried on in the United Kingdom alphabetically arranged and carefully classified under 871 branches of industry, under each of which is given the names and addresses of the manufacturers of the particular class of goods specified. The second section comprises a list of 833 towns in Great Britain and Ireland alphabetically arranged, under each of which is a list of its principal manufacturers, with in many instances a full description of their specialities, supplied by the firms themselves. The volume will, doubtless, form a useful book of reference for merchants and men of business, and from the immense amount of labour which its production must have involved is certainly entitled to extensive patronage.

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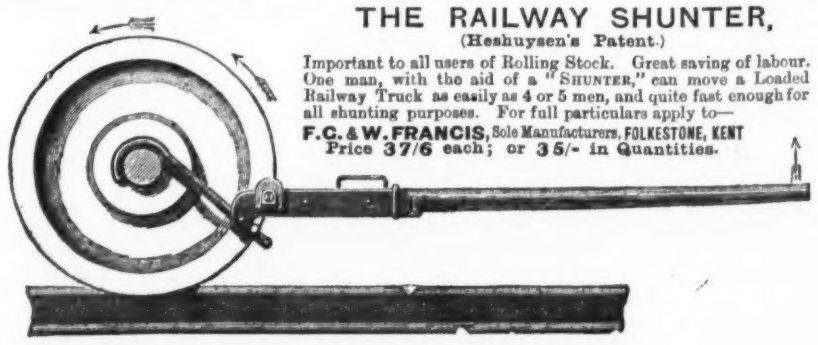

RAISING AND FORCING WATER.

A peculiar construction and arrangement of apparatus for the raising and forcing of liquids, and for exhausting and compressing or forcing air and gases, has been patented by Mr. J. F. BRINJES, of the Animal Charcoal Works, Whitechapel; it consists in the combined use of a cylinder acting as a piston or plunger working eccentrically within an outer fixed cylindrical casing of any desired length and diameter and between two end covers, and having a gyratory in lieu of a rolling motion therein, as heretofore, with a radial web or partition regidly secured longitudinally to the outside of the said gyratory cylinder or piston, and working fluid-tight within a radially disposed chamber, which is formed on and extends the entire length of the outer cylindrical casing, the inlet and outlet orifices being situate on opposite sides of the said chamber.

The gyratory motion is imparted to the said inner cylinder or piston by one or more cranks or eccentrics carried on a revolving shaft concentrically disposed within the outer fixed cylinder, and working in bearings in the end covers, and as the before-mentioned web or partition is rigidly secured to the inner cylinder or piston, and is also controlled by the chamber on the outer cylindrical casing, within which it works to and fro, it is obvious that although the inner cylinder or piston will be caused to follow a circular course round the inside of the outer cylindrical casing, it cannot rotate on its own axis or roll over the interior of the said outer cylinder, its motion being, in fact, precisely analogous to that of an ordinary eccentric strap and rod. The motion of the gyratory cylinder or piston will, of course, depend on the length or amount of eccentricity of the actuating crank or eccentrics, and the difference between the diameter of the inner cylinder or piston and the outer fixed casing. The inner or gyratory cylinder or piston may be set up as occasion requires through wear to ensure its working fluid-tight against the interior of the outer cylinder by a tapered antifriction roller or wedge-shaped rubbing piece interposed between the interior of the gyratory cylinder or piston and the crank pins or eccentrics; the roller or rubbing piece being forced inwards from one side causes the gyratory cylinder or piston to fit tighter against the interior surface of the outer casing.

In lieu of the said roller or rubbing piece the interior of the gyratory cylinder or piston may be provided with an indiarubber cylinder having a metal collar or ring in its interior for the actuating cranks or eccentrics to work against, or spiral or other springs may be substituted for the said indiarubber cylinder. The end covers of the outer casing are accurately ground on their inner faces, the corresponding ends of the gyratory cylinder or piston and web or partition piece being also ground. In order to admit of end adjustment to maintain a fluid-tight junction between the ends of the gyratory cylinder or piston and the end covers a ring of indiarubber or other elastic material is interposed in recesses or otherwise between one or both of the said covers and the ends of the outer casing to allow of their being tightened up by adjusting screws provided for that purpose.

TREATING NICKEL ORES AND ALLOYS.

Although the recent attempt to form a European company to develope the nickeliferous deposits of New Caledonia did not prove successful, there is no doubt that the New Caledonian ore will come largely into the market, so that improved methods of treating it are not without interest. The invention of Mr. ALEX. PARKES, of Gravelly Hill, near Birmingham, has mainly for its object to obtain nickel alloys and nickel from New Caledonian nickel ores and other oxidised ores of this metal. For this purpose he fuses oxidised compounds of Caledonian ores of nickel with oxide of copper together with fluxes, in order to collect the nickel and copper in a metallic state reduced together from their oxidised condition to an alloy so fusible that it can be smelted in a reverberatory or other furnace, and when properly melted it is tapped into sand beds, by preference metal and slag together; when cool the nickel and copper alloy is found well separated from the slag; or the slag may be first skimmed off the surface, as in copper smelting, and the nickel alloy run into water to granulate it.

The nickel alloy, whether in pigs or granulated, is now placed in a calcining or roasting furnace, and submitted for about four or five hours to calcining or roasting, in order to oxidise a considerable portion of the alloy, especially the iron, it may contain, when the heat is increased and the alloy melted down with silica or lime in the roasting furnace; by this treatment most of the iron and other impurities are separated from the nickel and copper; if not all taken out oxide of copper is thrown on from time to time to free the alloy from iron in the form of a black silicious slag; this is skimmed off after every addition of oxide of copper from time to time, and when the workman finds from experience that all or most of the iron is practically separated the alloy is either tapped out into sand beds or water, or ladled out with iron ladles and poured into iron moulds. From 2 to 3 cwts. of oxide of copper will be sufficient for 1 ton of rough metal. Or in place of roasting or calcining the crude nickel and copper alloy as at first formed he melts it down at once in a reverberatory furnace, and adds oxide of copper (by preference mixed with silica, or lime, or aluminous substances) from time to time, fuse and skim off the slag until it is found that all or most of the iron is oxidised and separated in the slag.

The alloy, well freed from iron and other impurities, may be at once used the preparation of alloys called German silver, by fusing it with varying proportions of copper and zinc; but before doing so he prefers to refine and toughen the the alloy (after it has been roughly refined), to separate any remaining iron or other impurities, as before described. This may be done in crucibles, reverberatory furnaces, or in a cupellation furnace; the alloy is to be fused, and if any impurity, such as iron or other deleterious matter, remains more oxide of copper is added, and after the reaction is finished the flux is removed by skimming it off, and then he employs a refining process similar to copper refining by poling, or he refines by means of a toughening flux of borax and fluor spar with a little carbon or other refining flux. The metal thus obtained is of the finest quality,

In carrying out the first part of his process on a large scale at the New Caledonian Nickel Works, Birmingham, Mr. Parkes has found the following proportions of flux and oxide of copper most satisfactory. For 1 ton of New Caledonian nickel ore of 10 per cent. nickel he employs 2 to 3 cwts. of oxide of copper, 3 to 4 cwts. of fluor spar or cryolite, 2 to 3 cwts. of anthracite coal, ½ to 1 cwt. of rock salt; all the above substances are by preference ground so as to pass through a sieve ¼ in. mesh, all being well mixed and made damp with water to prevent loss when throwing the charge into the furnace. The charge is melted in a reverberatory furnace in from four to five hours; in order to collect the alloy of nickel and copper formed by fusion of the above proportions of substances together, he puts into the melted charge from 1 to 2 cwts. of metallic copper in a granular state about one hour before tapping out the charge. This addition collects the nickel alloy more completely. He either runs the whole of the melted charge into sand beds. or he skims and taps it into water.

Another part of his invention consists in fusing New Caledonian nickel ores and other similar nickel ores, especially if of low percentage, together with sulphur or sulphate of lime or sulphate of baryta, together with carbon and the fluxes above mentioned: by this means a very fine sulphide is formed, easily converted into nickel of the finest quality, or an alloy of nickel, by the method first above named, or by the well-known wet method of preparing nickel. The fluxing will greatly depend upon the proportion of earthy matter in the ore. He also employs iron pyrites, copper pyrites, or arsenical compounds as fluxes to the New Caledonian ores and sulphate of soda or rock salt. For 1 ton of New Caledonian ore—say, of 5 per cent.—he finds the fluxing is well effected thus:—20 cwts. of nickel ore, 1 to 2 cwts. of fluor spar, 2 cwts. sulphate of lime or sulphur, 2 cwts. carbon anthracite; all the substances are ground and passed through a sieve ¼ in. in the mesh, well mixed, wetted with water, and charged into a reverberatory furnace by preference. This charge will melt well in from four to five hours, and may be run out altogether into sand beds or first skimmed, and the regulus run into water to granulate it; or the regulus may be ground by machinery. The regulus is either to be calcined and fused with oxide of copper to collect and form a nickel alloy, as at first described, and treated in the same way, or the regulus may be treated by the well-known method of refining nickel. In place of fluor spar he sometimes uses cryolite and sulphide of iron or copper as fluxing matters with salt and carbon in obtaining a regulus.

FOREIGN MINING AND METALLURGY.

The intelligence to hand this week with respect to the Belgian coal trade has not presented much interest. The extraction effected and the deliveries made indicate about the same importance as they did a week since; in other words, they show a certain amount of activity, which is maintained without increasing. It is stated—although with some hesitation—that the working miners of the Midi de Flénu are about to go out on strike; should this report prove correct deliveries from that quarter would naturally be stopped for a time. The alarming war rumours which have prevailed during the last few days have, of course, had a tendency to prevent both producers and consumers from entering into too long engagements before hand. The La Haye Colliery Company will pay a dividend of 2l. per share for 1875-6, on Nov. 3.

The French coal markets exhibit, upon the whole, a rather considerable amount of activity. Orders continue to come to hand at Paris, notwithstanding that the weather in that capital has remained tolerably fine. In the Nord coalowners have every reason to be content, less, perhaps, with the aspect of the market (which is not so much changed as some writers on the subject would fain lead us to suppose) than with the hopes which the sugar-producing season now induces. The sugar beet of this year are below the mark as regards their saccharine richness, but it is expected that this circumstance will lead to an increased consumption of coal rather than otherwise, as it will become necessary to treat a greater quantity of juice in order to obtain the same weight of sugar. At the same time, the first orders received from the sugar manufacturing interest have thus far not been sensibly larger than those of average seasons. Prices have not varied, but they have been supported with firmness in the Nord. In the basin of the Loire and at Paris prices have been maintained. It is reported that the direction of railways in France will shortly be separated from that of public works and navigation. This report has been received with interest by the French coal trade, as if it is true it may have some bearing upon their interests. The Minister of Public Works has under consideration the improvement of all the navigations existing in France. An endeavour is to be made to secure a minimum depth of water of 7 ft. 1 in., and an extension of sluices wherever the conditions of navigation render the change necessary. These ideas are so vast that serious efforts will have to be made to secure their realisation. Second and third-class carriages are to be warmed this winter upon all the great French lines. The Cormaux Mines Company will pay on Nov. 2 an interim dividend of 1l. 4s. per share. The concern known as the Forges et Chantiers de la Mediterranée will pay on Nov. 1 an interim dividend for 1876 at the rate of 16s. per share. The Mokta-el-Hadid Magnetic Iron Minerals Company will pay on Nov. 2 an interim dividend for 1876 at the rate of 16s. per share.

Contracts are about to be let for 30 miles of iron sleepers on the Hilf system for the Belgian State railways. Tenders were recently invited for old materials from the Belgian State lines, but the offers received were not approved by the Government authorities, as they were not considered sufficiently high. The view which industrials take of this matter is that they cannot deliver their products at rates which leave them scarcely any profit unless they are accorded some little "compensations" when they are invited to tender for old materials. Tenders have been received for an iron bridge to replace a wooden structure—the Amercœur bridge at Liége; the lowest tender was that of the John Cockerill Company, which stipulated for 2790l.; five tenders were delivered. Belgian industrials have been invited to send specimens of their products to an exhibition about to be held by the Polytechnic Institute of Shanghai. An engine for tramways, with which experiments have been recently made at Verviers, is about to be tried also at Brussels. Contracts for rails, bolts, fish-plates, locomotives, &c., are about to be let at Wilhelmshaven, Altona, and Breslau.

There is a persistent improvement in the French iron trade; almost everywhere there is more business doing, while prices exhibit a little more firmness. At the same time it can scarcely be said that quotations have improved. Merchants' iron No. 2 continues to be quoted in the Nord at 7l. to 7l. 4s. per ton; first-class rolled cokemade iron makes 7l. 4s. to 7l. 12s. per ton in the Haute-Marne. For iron for building purposes about 7l. 12s. per ton is being paid upon the Paris market. The quantity of iron which has entered Paris thus far this year presents a sensible increase as compared with the corresponding period of 1875; this improvement is likely to become more decided so long as the works of the new Avenue de l'Opera are pushed forward with vigour as they are at present. The Committee of French Forgemasters has held its monthly meeting for October; nothing appears to have transpired with reference to the warrant question.

Copper has advanced rather sensibly at Paris, but business has not presented any very great amount of activity. Chilian in bars, delivered at Havre, has made 82l.; ditto, ordinary descriptions, 80l.; ditto, in ingots, 82l.; and pure Corocoro minerals, 80l. per ton. Upon the German copper markets the demand has been rather stronger, and prices have advanced. Advices from Rotterdam report a rather rapid advance in tin. Banca has made 44 fl., and disposeable Billiton 43¼ fl. At the last dates the market was quieter, Banca being quoted at 43¼ fl., while Billiton had changed hands at 42⅜ fl. At Paris Banca, delivered at Havre or Paris, has made 79l.; Straits ditto, 80l.; and English, delivered at Havre or Rouen, 78l. per ton. The German tin markets have been advancing. At Paris lead has made 21l. 4s. per ton, with, however, only a restricted business. The German lead markets have been destitute of interest, but the article has been pretty well sustained. There has not been much doing in zinc at Paris, but prices have been sustained at Marseilles; rolled Vieille Montagne has made 32l. per ton. Upon the German zinc markets prices have been firm, but there has not been any very great amount of business doing.

ON A NEW WATER-PRESSURE PUMPING ENGINE AT CLAUSTHAL.*

The completion of the Ernst August deep adit level at Clausthal having relieved the older mines of a large amount of water that was formerly pumped up and discharged through the shallower adit known as George III.'s deep level, the water-power thus rendered disposable has been utilised in the establishment of a central deep pumping station for the whole district in the new Queen Mary shafts, where a quantity of 770 gallons of water may be lifted per minute to a height 754 feet. The fall of water available as a pressure column is 1207 ft.; but in order to avoid the necessity of heavy reciprocating rods, the engines, designed by Bergrath Jordan, of Clausthal, in imitation of the newer kind of direct-acting steam pumping engines used in collieries, have been placed at the bottom of the shaft, 1958 ft. below the top of the pressure column, and 751 ft. below the deep adit through which the water is discharged. The construction of the engines is similar to that of a direct-acting steam-pump, there being two double-acting pressure pistons, each having a double-acting plunger pump placed behind it, the opposite ends of the piston rods being connected with a fly-wheel, which carries the valve gear for the engines. This consists of a pair of eccentrics, moving pistons valves which, in order to prevent shocks in the tubes at the change of stroke, are made somewhat shorter than the admission and discharge ports, so that when in mid-stroke the waterways are not completely closed. The main pressure cylinders, with their pistons and rods, are of gun-metal, as well as the valve pistons, which work in a tube lined with the same metal. Both engine and pump pistons are without packing, being turned to fit accurately in their working barrels, and are provided with annular grooves to prevent the passage of fluid from one side to the other (Ramsbottom's construction). The pistons of the pressure engines are 12·2 inches in diameter, those of the pumps 12·9 inches, the length of stroke common to both being 24·6 inches. The piston rod, which is carried through both cylinder covers is 6·5 in. thick. The effective volume of the cylinder from these dimensions, requires a consumption of 14·5 gallons of water per revolution, apart from that expended by the valve cylinder, while the corresponding discharge of the pumps is 17·2 gallons, so that the effective duty of the engines appears to be about 66 per cent. of the power developed by the pressure column. With a piston velocity of 19·7 inches per second, about 50 revolutions are made, and 830 gallons of water are lifted per minute. The pumps have short suction pumps and double beat valves, whose seats are one-fourth of the sectional area of the pistons, after allowing for the section of the rods. The power water, after doing its work in the engines, is discharged with that lifted by the pump through a common rising pipe. At this speed the velocity of the water in the driving column and rising pipe is about 3·28 ft. per second; the former has to resist a pressure at the lower end of 60 atmospheres, and the latter of 23 atmospheres. The author points out that although a plunger-lift of 754 ft. is very different from anything used in his own district (Freiberg), a single lift of the same height was adopted in Juncker's water-pressure engine at Huelgoat, and that the engine at Illsang, forcing brine to a height of 984 ft. with one pump, worked for nearly 40 years without stopping. He concludes with the expression of a doubt as to whether the disadvantage of using rotary water-pressure engines under such a heavy backwater pressure may not more than counterbalance the advantages derived from the abolition of pump rods in the shaft. H. B.

— C. R. KORNEMANN, Berg-und hüttenmännische Zeitung.

* From JAMES FORREST'S "Abstracts of Papers in Foreign Transactions and Periodicals, for the Proceedings of the Institution of Civil Engineers."

ADVANCED TEXT-BOOK OF GEOLOGY.

The popular and attractive style of all Prof. Page's books on Geology is already appreciated by a large number of both students and general readers, so that in noticing the sixth edition of his well-known "Advanced Text-Book"* it would almost suffice to say it fully maintains the author's reputation; but, the volume having been much enlarged, some further reference may be made to it. It will be recollected that Prof. Page's introductory treatise gives an outline of the science, and sufficient for those who wish to become acquainted merely with the leading facts of the science, whilst the advanced presents the subject in detail so as to adapt it to senior pupils and those who desire to prosecute the study in its principles as well as deductions. The advantage of the two volumes being written by one person can scarcely be over estimated, for it enables the student who has mastered the elementary treatise to continue his study without either re-traversing the same ground or having anything to unlearn; and, as Prof. Page very truly remarks, his acquisition of the science will have been rendered much more easy and agreeable. Prof. Page has a strong conviction on this point, and observes that in teaching the construction of the steam-engine, for instance, the most natural course is to explain, in the first place, its more prominent features—its boiler, steam-pipe, cylinder, piston, crank, and fly-wheel—and when the learner has acquired a knowledge of these parts, and the force which sets them in motion, then to proceed to the more intricate connection of valves, condenser, hot-well, air-pump, eccentric rod, governor, and other complicated machinery. By adopting this course no confusion is created in the mind of the learner; he is impressed with gradual and permanent convictions, has nothing to unlearn, and may at length proceed with some degree of confidence to estimate the power of the entire machine as depending on the consumption of fuel, the elasticity of steam, the dimensions of the several parts, and the force lost through friction. So it is with every science; let an outline be given of its leading features that the beginner may arrive at some notion; let this be followed by the details, and the details by the higher reasonings and philosophy of its problems. Prof. Page has aimed at the production not only of class-books for schools, but readable manuals for self instruction, feeling assured that once furnished with proper methods, and imbued with the right spirit, the earnest student has in general very little difficulty with details—every acquisition of his own not only widening the basis of his knowledge, but increasing his power to master new difficulties as these may arise in the course of his onward progress.

The introductory outline is followed by a chapter on the general relations, structure, and conditions of the earth, and these are followed by others on geological agencies resulting from the general relations of the earth, or those chiefly concerned in the modification of its rocky crust; on the general arrangement and relations of the materials composing the earth's crust; on the composition and characteristics of the principal rocks and rock-masses, the classification of the materials composing the earth's crust into systems, groups, and series; on the igneous rocks, comprising the granitic, the trappean, and the volcanic, with their relations to the stratified formations; on the metamorphic or hypozoic system, embracing the gneiss, quartz rock, mica schist, and clay-slate groups; on palæontology—the general characteristics of fossils; on the Laurentian system, embracing the earliest fossiliferous schists, slates, and altered limestones; on the Cambrian system, embracing the lower and upper series of fossiliferous schists, slates, and grits less metamorphosed than the Laurentian; on the Silurian system, embracing the lower and upper Silurian groups, or the Llandeilo, the Wenlock, and the Ludlow series; on the Old Red Sandstone and Devonian system, embracing the lower, the middle, and the upper groups, according to British geologists; on the carboniferous system, embracing the lower coal measures, the mountain limestone, the millstone grit, and the upper or true coal measures; on the Permian system, embracing the lower New Red Sandstone and the magnesian limestone; on the triassic system, comprising the bunter Sandstein, the muschelkalk, and the keuper of Germany, or upper New Red Sandstone of England; on the oolitic system, embracing the lias, the oolite, and the wealden; on the chalk, or cretaceous, system, comprising the greensand and the chalk groups; on the Tertiary system, embracing the eocene, miocene, pliocene, and pleistocene groups; on the post-Tertiary, or recent, system, embracing all superficial accumulations and changes that have taken place since the close of the drift, or during what is usually termed the human epoch, and on contemporary or equivalent deposits.

These 21 chapters are followed by a general review of the stratified systems with theoretical deductions, whilst the concluding chapter is devoted to the consideration of the economic aspects of the science, and the methods of practical procedure. The whole is succeeded by an excellent glossary of technical terms, and by a copious general index.

A more methodical and concise treatise on the science of geology than that of Prof. Page does not exist, and the repulsive dryness of by far too many scientific books is altogether absent; whilst so much new matter and so many new illustrations have been introduced that even compared with the former editions, which were generally acknowledged to be excellent, the present is vastly superior from its nearer approach to completeness, and the recent date as regards newly-ascertained facts to which it has been brought down.

* "Advanced Text-Book of Geology, Descriptive and Industrial." By DAVID PAGE, LL.D., F.G.S., Professor of Geology in the Durham University College of Physical Science, Newcastle on Tyne. Sixth edition, revised and enlarged. Edinburgh and London: William Blackwood and Sons.

* MEDICAL OPINIONS OF THE EFFICACY OF HYDROPATHY AND THE TURKISH BATH, BY RICHARD METCALF. — Our work as a journalist of mining, railways, and other scientific interests prohibits our publishing extensive reviews of various interesting publications that are sent to us; we must, therefore, give a very short notice of the work before us. All our readers are, however, interested in the relative questions involved in the words allopathy, hydropathy, homœopathy, and to those who have time and leisure we commend the present little work as worthy of attentive perusal and profound thought. It will interest all readers from its minute record of the great Lord Lytton's experiences, and is undoubtedly instructive from its record of the medical opinions set forth. It appears now to be an almost universal opinion that the Turkish bath is a sudorific of unspeakable value, and possesses powers curative and preventive of disease of the greatest importance. It is not for us to give any opinion as to hydropathy, but we are willing to say to its opponents *audi alteram partem* At all events Mr. Metcalf has taken great trouble in the collection of his facts, shown a remarkable faculty of order in their arrangement, and strict logical precision in his modes of argument. Without giving or having any opinion of our own, we commend the book for perusal as a clever and well compiled production.

* London: JAMES BURNS, Southampton-row.

WOOD CONVERSION BY MACHINERY.—The extension of the use of machine tools during the past half-century has been really surprising, and the single circumstance that on Wood Converting Machinery alone Mr. John Richards has been enabled to write a very attractive volume* might be regarded as an ample proof of that fact. The contents of the volume originally appeared as a series of articles in the Timber Trades Journal, but the literature of the subject is so exceedingly meagre that it was thought desirable to preserve them in a more convenient form. The influence of machine work upon the wages and interests of skilled workmen in some cases is one of those complex problems of which no solution is likely to be reached even by a generalisation of facts and results; but Mr. Richards points out that, with respect to wood manufacture, the beneficial results of machine application is so well known that the opposition to machinery once so common in Europe has now almost ceased. Everywhere workmen have been raised and benefited in a social and educational point of view, wages have increased, so also has the amount of work to be done, and generally in proportion to the extent which machinery has supplanted hand labour. In the second chapter the inventions of Sir Samuel Bentham pertaining to wood cutting are noticed, veneer cutting, the rotary wedge, saw and lumber guides, curvilinear sawing, wave moulding, saw grinding, wood bending, &c., being in turn referred to; and there are chapters on patent monopoly in wood conversion, factory buildings for wood manufacturers, foundations for reciprocating machines, the principles of construction and operation of the various kind of saws, the methods of shaping wood, and so on. The book is altogether thoroughly practical in its character, and likely to prove exceedingly useful to all connected with the business.

* "Wood Conversion by Machinery." By JOHN RICHARDS, M.E. London: J. and W. Rider, 14, Bartholomew Close.

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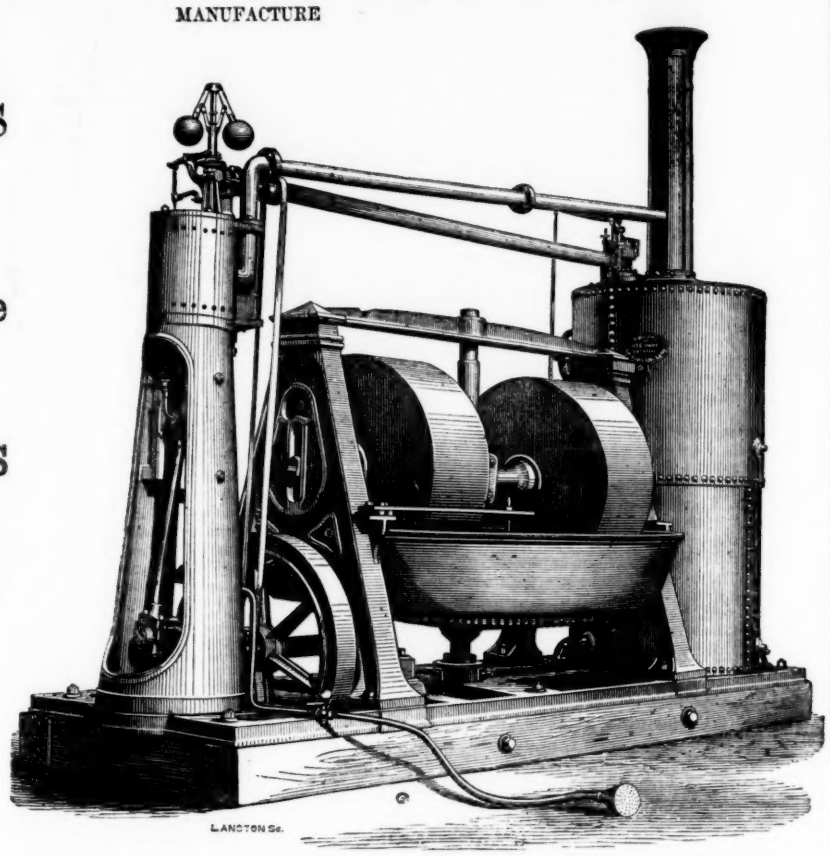


TAYLOR'S DRUM DRESSING MACHINE.

FIG. 1

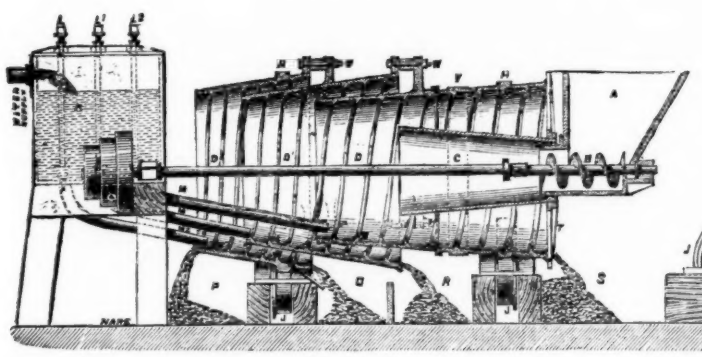
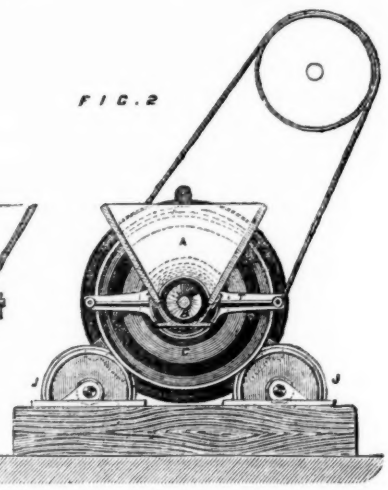


FIG. 2



TAYLOR'S DRUM DRESSING MACHINE.

We give an illustration of Mr. H. E. Taylor's Drum Dressing Machine for washing or separating ores and substances of different specific gravities, and sizing material, which has been previously ground or otherwise reduced and prepared for treatment. The above machine has been designed for the purpose of concentrating ores from their gangue with greater simplicity and rapidity than any apparatus yet introduced for finishing ore; also for sizing materials in a more perfect manner than can be done by sieving or other like process; and for separating and washing out slimes from the coarser particles of stuff which may require re-grinding or crushing.

The drum dresser, from its extreme ease in manipulation and thorough manner of working, is also an excellent coal washer.

The machine consists of an arrangement of conical drums, telescopically fixed, and mounted on friction rollers on a horizontal axis so as to allow of their being rotated. In the interior of these drums is formed a variable screw thread, the pitch and depth of the threads being greatest at the larger and gradually diminishing towards the smaller end. At the smaller or higher end of each drum is introduced a stream of water.

The following is a description of the apparatus, with the letters of reference on the drawing:—A is a hopper into which the materials are thrown which require separation. B is a worm driven by the shaft and cone pulley, as shown on the drawing, for delivering a regular supply into the machine. C is a cone which traverses the material into the desired position in the first cone, D. D D^1 D^2 are conical drums, and in their inner surface is formed the screw thread, E E E, the number and pitch of which can be varied with the quality of the material it is proposed to treat. J J are rollers supporting the cones, and upon which they revolve, the drums being driven round by a belt at V, or any other suitable means. M M^1 M^2 are pipes conveying the water into the interior of the machine, the supply being controlled by the plugs, L L^1 L^2.

In working, the material is first conveyed into the hopper, thence fed by the worm—in the quantity found best by experience—into the cone, which traverses it to the desired position in the drum D. Upon the machine being rotated the tendency of the threads of the screw E is to carry the material up the inclined slope of the drum, but meeting with the stream of water issuing from the pipe M, a separating action is produced, the rotary motion of the machine exposing all the particles over and over again to the action of the water, the lighter ones, being washed over the notches formed by the threads, are deposited at S, while the heavier particles or ore gradually settling in the spaces between the threads are carried up against the stream, and deposited in the next drum, D^1. The same result is produced in this drum after the first partial separation in drum D, but in a more marked degree, the threads of the screw being finer pitch, and not so deep, and the slope of the sides being greater, the capacity of the spaces between the threads is less, and owing to the finer pitch of the screw, the material is left a longer time exposed to the action of the water issuing from the pipe, and so a more searching separation is obtained. The same result is produced in D^2 upon what is carried up to it, the separation being still more thorough, owing to the similar construction of screw threads and slope of cone sides.

To promote still further the separating action of the machine, the screw threads in the lower ends of the drums are deeper than the threads at the smaller end, so that although the material fed into the machine may fill the threads in the larger end of the cone; by reason of the rotary motion this quantity is constantly being compelled to overflow the threads higher up, and so the water is able to overcome any large particles which might otherwise by their size, independent of their specific gravity, be carried up in the thread. The conical form of the drums is also especially designed to assist in a most important manner the action of the water by allowing the stream, which is deep, contracted, and consequently rapid, when flowing over the heaviest particles at the smaller end, to gradually spread itself out, decrease in rapidity and depth, and so give time for small grains of heavy material to settle themselves again in the threads, instead of being washed down with the lighter particles. If the machine were made cylindrical this property would be lost. The dresser can be adjusted with the greatest delicacy to suit the different wants of ore separation in a variety of ways; by altering the flow of water, the speed of the machine, and the angle which the lower portion of the cones form with the horizon. Thus the machine will be seen to be eminently adapted for the separation of ores from their gangue and coal from its impurities:—

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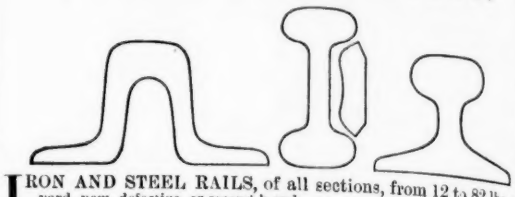

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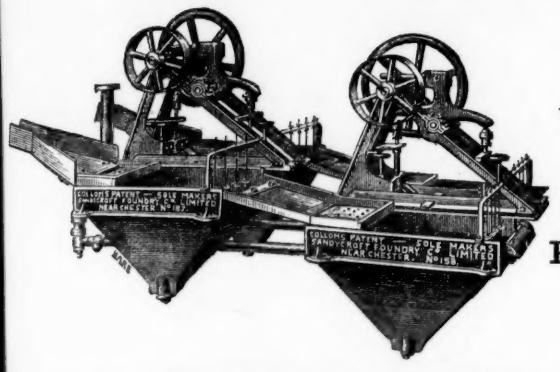
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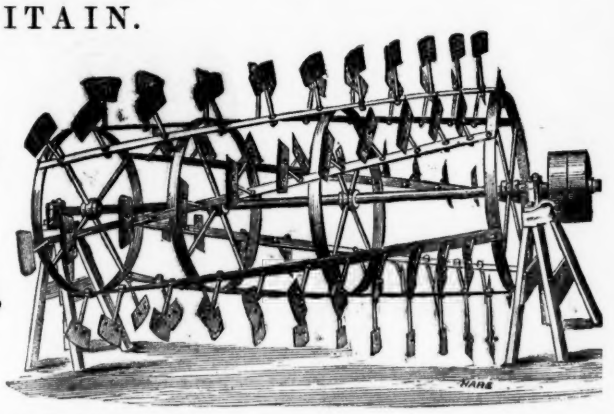

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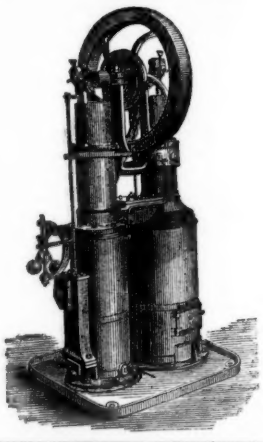

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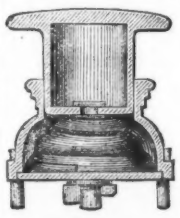

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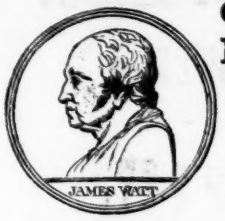

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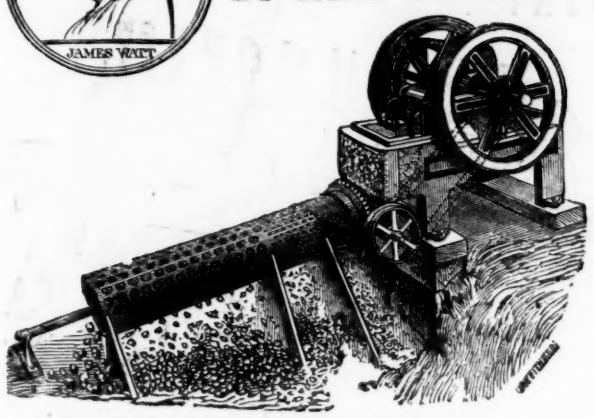

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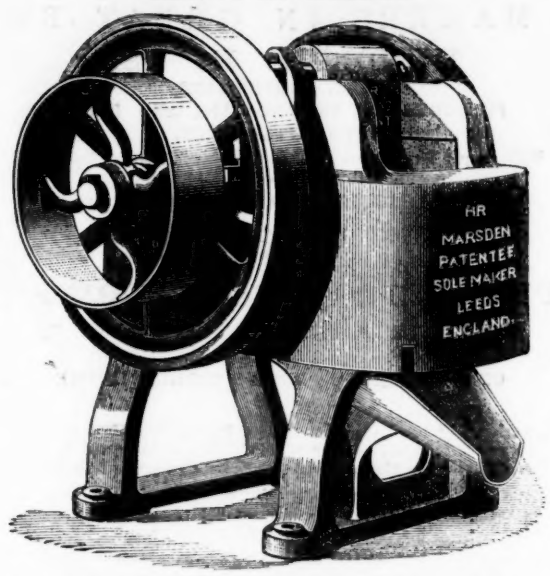

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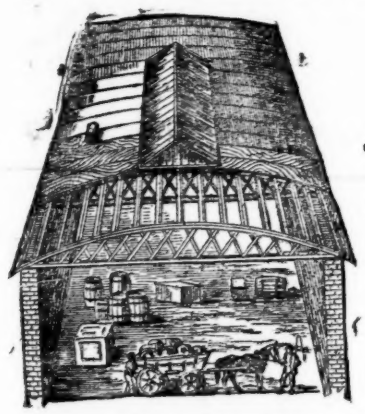

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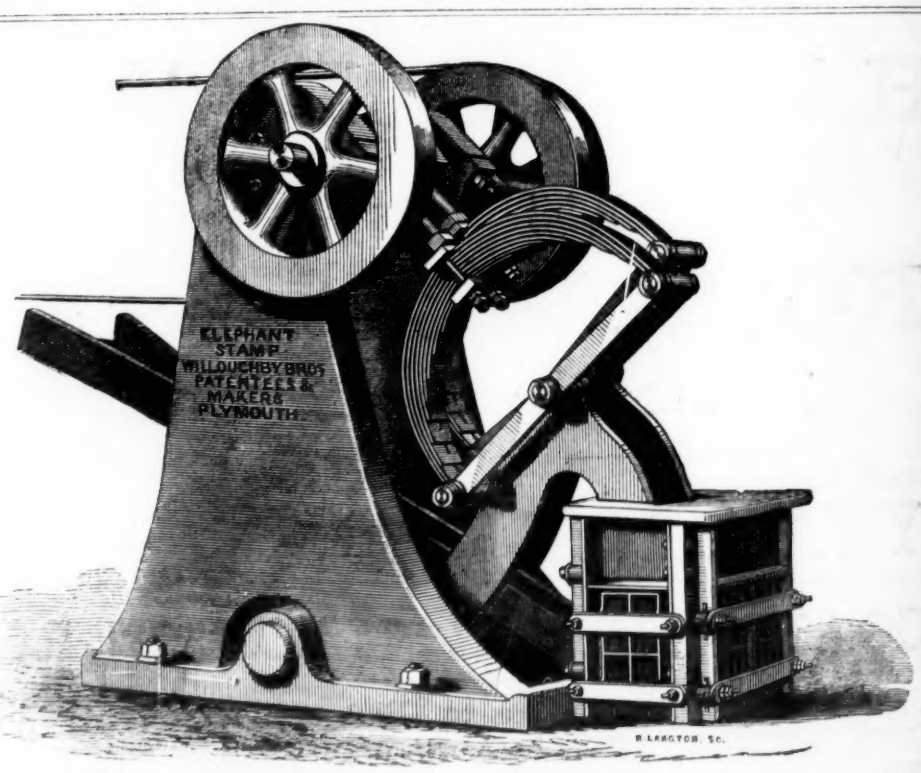

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